PRELIMINARY

DRAFT 2007 AQMP
APPENDIX IV-C

Regional Transportation Strategy and Control Measures

September 2006

Mission Statement

Leadership, vision and progress that promote economic growth, personal well being and livable communities for all Southern California.

The Association will accomplish this mission by:

- *Developing long-range regional plans and strategies that provide for efficient movement of people, goods and information; enhance economic growth and international trade; and improve the environment and quality of life.*
- *Providing quality information services and analysis for the Region.*
- *Using an inclusive decision-making process that resolves conflicts and encourages trust.*
- *Creating an educational and work environment that cultivates creativity, initiative and opportunity.*

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SUMMARY

This Appendix describes the Southern California Association of Government's (SCAG) transportation strategy and transportation control measures (TCMs) to be included as part of the 2007 Air Quality Management Plan (AQMP) and State Implementation Plan (SIP) for the South Coast Air Basin. This strategy was developed in consultation with Federal, State and local transportation and air quality planning agencies and other stakeholders. The four County Transportation Commissions in the South Coast Air Basin, namely Los Angeles County Metropolitan Transportation Authority, Riverside County Transportation Commission, Orange County Transportation Authority and the San Bernardino Associated Governments, were actively involved in the development of the TCM strategy of this Appendix.

Consistent with past practices and in response to the inter-Agency consultation process, the *Regional Transportation Strategy and Transportation Control Measures* portion of the 2007 AQMP/SIP consists of the following four related elements.

- Transportation Strategy and Emissions - Total regional emissions from transportation projects in the South Coast Air Basin (Basin) are derived from the 2004 Regional Transportation Plan (RTP). The long-term planning requirements from on-road mobile sources are met by the RTP process, while the short-term implementation requirements are met by the Regional Transportation Improvement Program (RTIP) process.

- TCM Project Identification - The TCMs included in the 2007 AQMP are a subset of the RTP/RTIP. The TCMs are derived from TCM projects listed in the first two years of the 2006 RTIP, which include ongoing TCMs from previous RTIPs and are based on the broad categories (TCM1) adopted in the 1994 AQMP/SIP. Examples of TCM1 categories are HOV lanes, transit improvements, park and ride facilities and traffic signal improvements. TCM projects with funds programmed for right-of-way or construction in the first two years of the prevailing RTIP are considered committed TCMs. In the event of a conformity lapse, only federally approved TCMs and exempt projects, in the first two years (fiscally constrained portion) of the most recent RTIP, will be allowed to proceed.

  SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users) provides for a formal substitution process that supersedes the process currently approved and implemented by SCAG. In the event that the criteria outlined in SAFETEA-LU are met, a formal SIP revision is not necessary for substitution of TCMs. SCAG will continue to update the TCM list to reflect new, completed and ongoing projects each time SCAG adopts a new RTIP and/or RTP.

- Timely Implementation – Once a TCM project is listed in an RTIP as a committed project, the implementation status must be reported on in subsequent RTIPs and RTPs until the project has been completed. The purpose of this reporting is to track the timely

implementation of TCMs, and to demonstrate that TCMs have been or are being implemented. Reporting is done through the timely implementation report which is included in each RTIP. This report assures implementation and compliance and is the primary tool used by SCAG and the federal agencies for TCM implementation tracking. As part of the RTIP process, the Transportation Conformity Working Group receives draft timely implementation reports as appropriate. SCAG maintains a list of completed TCMs on its website.

- Reasonably Available Control Measure (RACM) Analysis – The Federal Clean Air Act (CAA) requires that a RACM analysis be included as part of the overall TCM strategy in the SIP. This analysis ensures that all potential TCMs are evaluated for implementation and that justification is provided for those measures that are not implemented. In accordance with EPA procedures, this analysis will consider TCM measures that are suggested during public comments, relevant measures adopted in other non-attainment areas of the country, and measures identified by the U.S. Environmental Protection Agency (EPA).

LINKING REGIONAL TRANSPORTATION PLANNING TO AIR QUALITY PLANNING

The air quality conformity requirements of the Federal CAA establish a need to integrate air quality planning and regional transportation planning. This integration presents the challenge of balancing the real need for improved mobility with the equally important goals of cleaner air and the enhanced social and economic well being of communities. As the Federally-designated Metropolitan Planning Organization (MPO) for the six-county Southern California region, SCAG is required by law to ensure that transportation activities "conform" to, and are supportive of, the goals of regional and state air quality plans to attain the National Ambient Air Quality Standards (NAAQS). In addition, SCAG is a co-producer, with the South Coast Air Quality Management District (AQMD), of the AQMP for the South Coast Air Basin. SCAG has the responsibility for the demographic projections and integrated regional land use, housing, employment, and transportation programs, measures, and strategies, as well as analyzing and providing emissions data related to its planning responsibilities (California Health and Safety Code § 40460).

The SCAG Region is the largest metropolitan planning area in the United States, encompassing 38,000 square miles. The Region is divided into 14 subregions and is one of the largest concentrations of population, employment, income, business, industry and finance in the world. The six-county SCAG Region is home to more than 18 million people, nearly half of the population of the state of California. The Gross Regional Product (GRP) for the Region, over $700 billion in 2005, shows that Southern California is the 10th largest economy in the world, while the State, as a whole, constitutes the 5th largest economy in the world. The South Coast Air Basin (Basin) has the worst air quality of the four air basins contained in the SCAG region.

SCAG is responsible for the creation of the Region's quadrennial long-range (20 year planning horizon) RTP and its biennial short-term (six year planning horizon) RTIP. The 2004 RTP represents the culmination of more than two years of work involving dozens of public agencies,

184 cities, hundreds of local, county, regional and state officials, the business community, environmental groups, as well as various nonprofit organizations, and was founded on a broad-based public outreach effort. A comprehensive list of Task Forces and Advisory Committees is included in the 2994 RTP, Appendix J[1].

The 2004 RTP was formally adopted by the SCAG Regional Council in April 2004, and approved by the federal agencies on June 7, 2004. The 2004 RTP, as updated by more current socioeconomic data and improved heavy-duty truck trip data, provides a basis for the transportation control strategy portion of the 2007 AQMP. It also provides the framework for aggregating sub-regional and local efforts to institute measures aimed at mitigating the adverse air pollution impacts from increased transportation activities. These measures are known as transportation control measures, and are the focus of this Appendix.

The RTIP is the vehicle used to implement the RTP. The TCMs in the 2007 AQMP are derived from the first two years of the 2006 RTIP. The RTIP also provides the schedule and framework for the timely implementation of the Region's TCM strategies.

Key Planning Factors: Challenges and Objectives

As the growth forecasts point out, the central challenge facing the Region is the prospect that the regional population is expected to increase by almost 5.8 million people (32%), from 2003 to 2035, employment by 2.5 million jobs (32%), and the number of households by 2.0 million (35%). Other demographic factors, such as the rapid aging of the region's population profile and proportional redistribution amongst the region's ethnic groups, may affect residential location decisions and affect commute and general transportation choices as well.

Accommodating this anticipated growth in a sustainable way—by taking account of ecological, economic and social factors, while enhancing quality-of-life indicators for present and future generations—represents the central challenge facing regional transportation planning in Southern California. Improvements in transportation mobility, both for people and for goods and services, and in progress toward meeting the NAAQS, must meet the goals of cost-effectiveness, environmental protection, and energy-efficiency.

It should be recognized that regional transportation and air quality plans, and ultimately their resultant SIPs, embody a commitment of resources by the region as a whole. However, as the designated MPO for the Southern California region, and thus also for the Basin, SCAG bases its responsibilities on the following four assumptions:

- There will be an appropriate commitment of fiscal resources from State and Federal sources.
- SCAG will continue to have responsibility over the official growth forecasts for the region.

[1] http://scag.ca.gov/rtp2004/2004draft/techappendix/Appendix_J_Task_Forces_final.pdf

- A monitoring system will be maintained to track implementation of the TCMs.
- There will be an appropriate commitment of resources supporting interagency consultation from local, State and Federal agencies involved in the process.

Additionally, the Regional Transportation Strategy proposed in the 2007 AQMP is predicated on the assumption that the following financial strategies adopted by SCAG's Regional Council (RC) will be implemented as expected:

- Protect/strengthen existing transportation revenues, including Proposition 42 revenues from the state sales tax on gasoline, truck weight fee revenues, and federal gas tax receipts;
- Continue local transportation sales taxes where necessary; allow 55 percent voter approval for local transportation sales taxes;
- Maximize motor vehicle fuel user fee revenue through pay-as-you-go and debt financing (assuming an adjustment to the gas tax rate to maintain historical purchasing power);
- Review methods for collecting revenues from alternative fuel vehicles;
- Support implementation of a development mitigation fee in San Bernardino County;
- Consider the feasibility of high-occupancy toll (HOT) lanes for new facilities; and
- Pursue user-fee-supported project financing for major regional investments where applicable.

Finally, it should be recognized that all the measures in this Appendix are taken from the 2004 RTP and the 2006 RTIP.

IMPLEMENTING A REGIONAL TRANSPORTATION STRATEGY

The Regional Transportation Strategy for the 2007 AQMP, as embodied in the 2004 RTP and further defined by the fiscally-constrained portion (first two years) of the 2006 RTIP, is part of a comprehensive vision to improve air quality, while at the same time enhancing mobility and assuring social and economic development. The transportation strategy and TCM projects proposed in this Appendix are an interconnected system, with the various components augmenting and reinforcing one another, rather than merely a mechanical aggregation of stand-alone actions.

Infrastructure improvements, transit and system management, and information services are being pursued within the context of a broad vision of the region's future. This transportation strategy outlines regional and sub-regional commitments to implement transportation improvements contained in the 2004 RTP and detailed in the first two years of the 2006 RTIP, and continues the blueprint contained in the 2003 SIP previously submitted to EPA.

The Regional Transportation Strategy is intended to maximize the emission reductions that can realistically be expected to be achieved from on-road mobile sources. However, it should be

recognized at the outset that potential improvements in air quality deriving from TCM and RTP strategies applied to on-road mobile sources are minimal. This is due to the fact that motor vehicle emissions have been substantially reduced through technology, individual TCMs affect only a small portion of regional travel, and that TCMs generally do not produce large scale changes in travel behavior. To attain the NAAQS, the Region will need to continue its focus on reductions from all emission source categories.

Historic Trends: Context and Conditions

As shown in Table 1, between 1980 and 2000, both population and employment have increased substantially in Southern California. During this same time period, the absolute number of home-to-work vehicle trips increased by 25 percent. However, the percentage increase in people driving to work alone is greater than the percentage increase in people using transit. The percentage increase in people sharing rides to work also lags appreciably. The absolute number of people that either work at home (including telecommuting), or ride a bicycle or walk to work, has dropped significantly for this same period as depicted in the "other" category in Table 1.

Clearly, and through the year 2000, the rate of increase in people riding transit and sharing rides to work has not kept pace with the rate of increase in home-to-work trips. There is a strong historic trend toward driving alone, and a primary goal of the RTP is to counter this trend.

This is one of the key challenges for regional transportation planning, and will continue to be a central concern for some time to come—ensuring that the proportion of transit and ride-share trips, as well as non-motorized and information technology-based strategies, increase their share of the total work-trips for the region, particularly over the next decade.

Table 1
Long-term Transportation System Trends: Southern California Region

	1980	2000	Change	% Change
Population	11,074,483	15,429,162	4,354,679	39%
Employment	5,402,323	7,089,958	1,687,635	31%
Total Home-to-Work Trips	4,898,642	6,102,839	1,204,197	25%
Drive Alone	3,493,490	4,648,117	1,154,627	33%
Carpool	844,424	960,356	115,932	14%
Transit	260,075	310,382	50,307	19%
Other	300,653	183,984	(116,669)	-39%

Growth Forecasts: Linking Socio-Economic Profiles to Land Use Patterns

As the designated MPO for the Southern California region, SCAG is responsible for generating the socio-economic profiles and growth forecasts on which land use, transportation, air quality management and implementation plans are based. The growth forecasts provide the socio-

economic data used to estimate vehicle trips and vehicle miles traveled (VMT). Emission estimates can then be forecast based on these projected estimates.

The monitoring of changes in regional socio-economic profiles is a key factor in tracking changes in land use patterns as they affect transportation system usage and, thus, air quality impacts. The regional land use forecast consists of allocating population and employment growth totals among zones, based on existing factors that can shape development. To the extent that land use policies and programs impact the allocation of population and employment growth, they will be reflected in the regional land use forecast, and therefore in the mobile source emissions estimate.

Reductions in emissions due to changes in the socio-economic profile of the region are an important way of taking account of changes in land use patterns. For example, changes in jobs-housing balance induced by changes in urban form and transit-oriented development induce changes in VMT by more closely linking housing to jobs. Thus, socio-economic growth forecasts are a key component to guide the Basin toward attainment of the NAAQS. SCAG provides the mechanisms by which changes in socio-economic profiles, which affect land use patterns, can be monitored on a systematic and on-going basis.

Southern California Compass Blueprint: Planning for Integrated Land Use and Transportation

Given the magnitude of growth projected over the 30-year RTP forecast period, and its potential impacts on traffic congestion, air quality, open space protection, etc., SCAG initiated a comprehensive growth visioning process called Southern California Compass as part of the 2004 RTP development process. Compass seeks to accommodate growth while maintaining mobility, livability, prosperity and sustainability goals for all residents in the SCAG region. Specifically, Compass aims to provide a policy framework for growth forecasts; consider balanced and efficient growth and transportation patterns; promote affordable housing choices; and provide direction on producing alternative urban form scenarios for the RTP.

At its core, Compass utilizes a technique referred to as scenario planning. Scenario planning, endorsed by the Federal Highway Administration (FHWA) and the U.S. EPA, explores multiple options for a region's future and how the choices we make today will affect future outcomes. SCAG, via Compass, developed literally dozens of different scenarios and modeled and analyzed each. Through an iterative process these scenarios were refined, and eventually one scenario was selected as the growth alternative for the 2004 RTP.

The following policy assumptions aiming to better link transportation and land use established the framework for the 2004 RTP:

- *Focusing growth in centers and major transportation corridors*
  By accommodating growth in existing or emerging centers and corridors, the region can greatly improve transportation performance. The centers themselves will be easily accessible from major freeways and also will include their own internal strong street network.

Balancing the location of jobs and housing is an important strategy in meeting regional goals of relieving congestion, reducing commute times and vehicle trips, encouraging alternate modes of transportation, and improving air quality. The Growth Vision Alternative achieves these goals via an in-fill strategy by locating job and housing centers in targeted livable communities suitable for accommodating additional growth.

- *Creating significant areas of mixed-use development*
  Mixed-use development uses the same strategy as centers-based development and ensures a strong balance of jobs and housing located near each another. Mixed-use development sometimes takes the form of well-designed retail shops and services with housing placed above or adjacent. It also refers to a larger neighborhood area with an appealing mixture of housing, shops, small offices and services, all within walking distance. The use of in-fill in aging and underutilized sites provides a means of accommodating growth, revitalizing neighborhoods, districts or communities, and makes efficient use of the existing infrastructure. Many existing corridors lack the residential and commercial density to adequately support non-auto transit uses. By intensifying these corridors with people-scaled and mixed-use developments, the existing transit system can more fully realize its potential for accommodating additional trips and taking strain off systems that are already at or over-capacity.

- *Targeting growth around transit stations*
  The principle of transit-oriented development (TOD) is particularly relevant to employment. For commuting by transit to be effective, major employment areas should not be dispersed but instead should be easily accessible to transit investments. In the Growth Vision distribution, employment density near major transit corridors and stations is quite high - providing an innovative and efficient partnership between land-use and transportation policies. By intensifying these stations with people-scaled and mixed-use developments, the existing transit system can more fully realize its potential for accommodating additional trips and taking strain off systems that are already at or over-capacity.

- *Providing housing opportunities to match changing demographics*
  Changing demographics will have an impact on the Region's economic future. The large baby-boomer cohort will begin retiring after 2010. Other changes on the horizon include increased immigrant (younger) population; increased household size, and lower per capita income. These changes necessitate variation in housing products as well as amenities to serve the changing population.

- *Ensuring adequate access to open space*
  Demographic trends, the need for adequate job opportunities and shelter, and the Region's historical development pattern set the stage for competing quality-of-life demands. Development patterns in the Growth Vision Alternative emphasize focusing growth in appropriate centers and corridors that make most efficient use of developed land and minimize encroachment on open public space. This should improve access to existing large-scale and neighborhood-scale open space.

- *Changing land use to correspond to the implementation of a decentralized regional aviation strategy and its consequent sort- and long-term job creation*
  The decentralized airport strategy creates a significant number of high-paying jobs in the short- and long-term. The Growth Vision alternative responds to this by creating the opportunity for well-balanced communities to support the additional workforce.

- *Changing land use to correspond to the implementation of regionally significant major transportation projects and their consequent short- and long-term job creation*
  New regionally significant infrastructure, such as highways and high-speed rail, is planned to serve future housing and job centers in the high desert areas of Los Angeles and San Bernardino counties and eastern Riverside County. Planned shifts of goods distribution functions to these areas also create long-term employment benefits.

- *Incorporating the local input and feedback on future growth*
  Ninety percent of the 193 jurisdictions participated during extensive public outreach over a two- year period for the development of the 2004 RTP Growth Forecast. This technical input and local expertise were critical in developing the 2004 RTP. Adjustments occur only after a ramp up period (post-2010) intended to establish consensus on an implementation strategy.

Regional Benefits of Compass

As part of the 2004 RTP planning process, the RTP was analyzed relative to baseline conditions. The analysis revealed that the strategies of the 2004 RTP contribute benefits to mobility, transit boarding, air quality and energy consumption over the forecast period. Of the benefits attributed to the 2004 RTP in year 2030, it was estimated that the Compass Vision distribution contributed approximately 50% of the VMT reduction, approximately 20% of the vehicle hours traveled (VHT) reduction, approximately 10% increased transit boarding, and approximately 70% of the reactive organic gas (ROG) emission reductions.

Implementing the Compass Vision

While Compass has succeeded in garnering citizens, planners and officials to create a shared regional vision, its ultimate success will be measured over time. Southern California can achieve maximum mobility, livability, prosperity and sustainability only through a series of agreed upon and feasible implementation tools. The Compass implementation plan focuses on reaching out to local decision-makers and the public at large to build support and local actions for the Vision through demonstrations of how minor changes in land-use and transportation decision-making can reap heretofore unexpected economic, mobility, and environmental benefits locally, sub-regionally and regionally. These Compass strategic opportunity areas make up about 2% of the region, thus, leading to the name “Compass 2% Strategy” for the implementation plan.

The Compass 2% Strategy for focusing growth in smart growth opportunity areas will be most successful when it compliments local visioning, inform local policy making, and integrates and aligns local planning with regional transportation investment plans. Collaboration with

transportation commissions, subregional councils of government, municipal governments and private developers will be a featured element in evolving the vision. Political support for the vision would be developed by taking the plan to cities and counties. The State, regions and local governments can collaborate on future planning to address and alleviate the need for housing.

To ensure collaboration and sustained public and stakeholder involvement, SCAG has convened the Compass Partnership comprised of business leaders, activists, academics, public officials and others to meet quarterly and serve as an extension of the Compass program into local communities.

The SCAG Regional Council continues to support the Compass 2% Strategy as a high priority program. As such, the following tasks critical to implementation have been underway since the adoption of the 2004 RTP:

1. Initiating Compass demonstration projects in critical growth opportunity areas with member cities and Council of Governments and providing technical assistance for projects that exemplify one or more of the key principles of the Compass Vision.
2. Targeting local governments to align their plans with the Compass Vision and providing assistance and training support to communities developing or updating general, specific and redevelopment plans and pilot projects.
3. Providing local governments, subregions and transportation commissions with development screening, scenario planning and real estate analysis tools, e.g. LA LOTS (Land Use Opportunity Tracking System) and other inter-regional partnership program tools.
4. Conducting an extensive public education, training and outreach program that promotes incentive based initiatives supporting Compass goals, e.g., Pilot corridor programs and local success stories.
5. Establishing benchmarking, program assessment, evaluation and monitoring guidelines in collaboration with subregional councils of government, transportation commissions, local government partners, and other applicable stakeholders.

Goods Movement: Development of a Regional Strategy

The discussion of land use and its relation to mobility and air quality must consider the significant impact that the region's goods movement system plays. While international trade and goods movement activities are key contributors to the State's and Southern California economic vitality, air pollution from these activities is a major public health concern at both regional and community levels. To address the economic growth, mobility, and environmental issues associated with goods movement, SCAG's Goods Movement Program seeks to optimize the region's transportation system through increases in economic efficiency, congestion mitigation, safety and air quality improvements, and enhancements to system security (http://scag.ca.gov/goodsmove/).

2004 Regional Transportation Plan's Goods Movement Strategy

The adopted 2004 RTP presents the region's most ambitious program of strategies and projects for improving the region's goods movement system and reducing its current impacts on congestion and the environment. In fact, the 2004 RTIP already committed $2 billion in goods movement-related projects that are slated to start within the next six years. Beyond this baseline and out to year 2030, the 2004 RTP proposed a series of system and physical enhancements aimed at improving the flow of goods through the region.

For instance, recognizing the need for additional highway capacity to handle increased truck as well as passenger traffic, the 2004 RTP proposes a $16.5 billion regional system of dedicated truck lanes along freeway corridors extending from the San Pedro Bay Ports, through the East-West Corridor (to be defined as part of Multi-County Goods Movement Action Plan) and out to distribution points northeast and southeast of the urbanized areas. Such a regional system would be funded through user-fees based on a per-mile toll. Implementation dates range between years 2020 and 2030. Therefore, the dedicated facilities offer a viable and potentially self-financing solution for mitigating congestion and reducing mobile source emissions arising from freeway operations in Southern California. In addition to the dedicated facilities, the 2004 RTP includes additional truck climbing lanes on four routes in Orange, Riverside, and San Bernardino Counties, with implementation ranging from 2010 to 2030.

The 2004 RTP also includes provisions for a regional rail capacity improvement program totaling $3.4 billion, which provides for both additional track capacity and mitigations in the form of some 130 highway-rail grade separation projects east of downtown Los Angeles. This strategy was identified as enabling the region to meet mainline rail capacity needs east of Los Angeles where triple and sometimes quadruple track improvements are needed. Bottlenecks such as the rail-to-rail Colton Crossing could also be addressed.

The RTP goods movement strategy included studying the viability of developing inland ports away from the water ports to serve as cargo facilitation centers. These facilities would function as inland sorting and depository centers for ocean and domestic containers, possibly transported via dedicated rail or truck facilities.

Subsequent to the adoption of the 2004 RTP, SCAG and its transportation partners developed a more focused regional consensus goods movement infrastructure project list, referred to as Southern California Regional Strategy for Goods Movement: A Plan for Action (amended March 2005), which was provided to the California Department of Business, Transportation & Housing as input into the State Goods Movement Action Plan. The list calls for approximately $6 billion in freight rail investments and $20 billion in highway investments to enable the region to handle the dramatic growth in goods movement. The rail investments consist of additional mainline capacity and new intermodal capacity to handle this growing segment of international trade. About a third of the rail-related investments are for grade crossing separations, which reduce traffic congestion, improve safety, and reduce pollution. The highway investments include a system of dedicated, toll-financed truck lanes, truck climbing lanes, rebuilt bridges and port access roads, and other freight related projects. In addition, $10 billion was earmarked for environmental mitigation that would be coupled with infrastructure proposals.

Air Quality Objectives

While the planning for the 2004 RTP considered the need for increased capacity to handle the projected flow of goods through the region and support the goods movement industry as an economic driver, it also considered the beneficial air quality impacts associated with an improved goods movement system. The public discourse related to goods movement subsequently evolved to focus more prominently on the environmental impacts from this source. Air pollution associated with goods movement is now more widely recognized as a major public health concern. At a regional level, the emissions associated with goods movement activities are significant contributors to exceedances of the health-based ozone and particulate matter NAAQS. At a local level, the emissions of diesel particulate matter from goods movement sources are a major component of increased adverse health risks in communities near the ports and associated transportation corridors. Health risks associated with exposure to the pollutants from goods movement activities include premature death, cancer risk, respiratory illnesses, and increased risk of heart disease.

The California Air Resources Board (CARB) estimates statewide premature deaths from goods movement to be approximately 2,400 annually, mostly from particulate pollution. Even after implementation of proposed CARB control measures, the estimate if premature deaths remaining is still very significant (approximately 1,600). CARB also estimated the cancer risk from activities specifically at the Ports of Los Angeles and Long Beach and found that the areas with the greatest impact outside port boundaries have an estimated cancer risk of over 500 in a million. The study found that the impact areas extend several miles from the ports.[2]

Previous to the CARB studies, an urban toxics monitoring and evaluation study was conducted for the South Coast Air Basin as part of the Environmental Justice Initiatives adopted by the AQMD Governing Board in October 1997. The Multiple Air Toxics Exposure Study (MATES-II)[3] found that mobile source related compounds tend to be generally high throughout the Basin; however, spatial variations show higher concentrations occurring along freeway corridors and junctions. In addition, higher levels of mobile source related compounds are estimated near major mobile source activities (e.g., ports).

The CARB and SCAQMD studies reveal that living close to freight transportation corridors increases health risk beyond regional levels. Consequently, the adverse health impacts associated with goods movement activities has significant implications for transportation planning in the region.

There is considerable effort underway by state, regional, and local stakeholders to address the numerous issues associated with goods movement. However, these efforts are not fully coordinated nor do they necessarily have the same objectives. While addressing the economic growth and mobility issues associated with goods movement, transportation planning agencies must include regional and community air quality improvements as an intrinsic component of a regional goods movement system. Investigation into a regional goods movement transportation

[2] CARB, *Proposed Emission Reduction Plan for Ports and Goods Movement in California*, March 2006.
[3] The SCAQMD is in the process of conducting a follow-up study (MATES-III).

system based on innovative freight movement technologies which could potentially reduce or eliminate diesel PM emissions should be the common goal of transportation planners and air quality agencies and other health officials. To this end, SCAG's comprehensive Goods Movement Program includes development, review, and consideration of state-of-the art and paradigm-shifting system-wide technologies that provide for economic growth, improved regional mobility, and the mitigation of both adverse localized air quality impacts (i.e., air toxic emissions) and regional air quality impacts (i.e., criteria pollutant emissions) associated with the goods movement activities. An overview of potential innovative goods movement technologies are described later in this section.

SCAG's Goods Movement Program and Studies

To facilitate the discourse on a goods movement strategy for Southern California, SCAG's Goods Movement Task Force meets on a monthly basis as a forum for stakeholders to advance a regional strategy. Agenda, meeting minutes, and presentations to the Goods Movement Task Force can be accessed at SCAG's website (http://scag.ca.gov/goodsmove/#taskforce). Over the past few years, a number of studies, reports, and strategies have been considered through this process as shown in the following list.

- Goods Movement in Southern California:
  The Challenge, The Opportunity, and The Solution, September 2005
- Southern California Regional Strategy for Goods Movement:
  A Plan for Action February 2005, Amended March 2005
  - Southern California Consensus Priority Goods Movement Projects
  - Map 1: Existing Goods Movement System in the SCAG region
  - Map 2: Needed Additions to the Goods Movement System
- Inland Port Feasibility Study: Draft Report on Inland Port Case Studies
  June 2006
- Final Report: Port and Modal Elasticity Study
  November 2005
- Inland Empire Railroad Main Line Study
  June 2005
- Subregional Freight Movement Truck Access Study
  July 2004
- Logistics and Distribution: An Answer to Regional Upward Social Mobility June 2004
- Regional Rail Capacity Improvement Program
  January 2004
- User-Supported Regional Truckways in Southern California
  January 2004
- CVAG Southeast Bypass Routing Study Report
  May 2003
- Goods Movement Truck and Rail Study
  January 2003
  - Technical Appendix: Subregional Freight Movement Truck Access Study
- Goods Movement Truck Count Study
  September 2002
- Los Angeles-Inland Empire Railroad Mainline Advanced Planning Study
  October 2002
- Empty Ocean Container Logistics Study
  May 2002

- Goods Movement Program White Paper: A Survey of Regional Initiatives and a Discussion of Program Objectives
  January 2002

In addition to the studies listed above, SCAG is either the lead or in partnership with other agencies/organizations for on-going efforts to address the various issues associated with goods movement in California and in Southern California in particular. The goal of these efforts is to develop a system-wide goods movement plan that accommodates the facility needs and economic opportunities of the region while ensuring that the adverse environmental impacts of the goods movement system are appropriately mitigated.

Because of the complexity of the issues and the numerous on-going and planned efforts of the goods movement stakeholders, the development of a comprehensive goods movement plan is beyond the timeframe of the 2007 AQMP. It is expected that the efforts underway will primarily help refine the goods movement strategies in the existing 2004 RTP, as well as introduce new technological strategies and environmental mitigation measures being investigated throughout the region. Accordingly, they will provide the basis for the goods movement portion of the next RTP update which is scheduled for adoption in December 2007 or the first quarter of 2008. The goods movement strategy developed for the RTP could then become the basis for a SIP amendment which incorporates applicable emission reduction strategies.

Table 2 below summarizes the current efforts of SCAG and other stakeholders related to goods movement. Two of the planning studies and an overview of innovative goods movement technologies are also described in greater detail following the table.

Table 2
Goods Movement Programs and Studies

SCAG Lead Studies		
Environmental Mitigation for Goods Movement	Develop a detailed strategy for investing a potential $10 billion in funding for mitigation of the environmental impacts of goods movement in the SCAG region. The study will identify potential control measures for goods movement sources, including ocean-going vessels, harbor craft, cargo handling equipment at marine terminals and intermodal yards, locomotives, and trucks. The study will rank the measures according to effectiveness (tons of pollution reduced) and cost-effectiveness (dollars per ton) and estimate their cumulative impact on the region's air quality.	6/07
Inland Port Feasibility Study	To determine the potential benefits an Inland Port could provide to both the public and private sectors, such as reduced highway congestion and community impacts, improved air quality, and increased supply chain efficiency and reliability.	6/07
Port and Modal Elasticity Study Phase II	Building on the previously completed SCAG Port and Modal Elasticity Study and railroad mainline studies, conduct additional outreach and research to further consolidate the case for private sector participation in financing infrastructure for goods movement.	6/07
Goods Movement Conceptual System Design Phase I & II	Develop a conceptual design for the region's goods movement system. This design will be used to communicate with stakeholders about the impacts and benefits of investments in the regional system. It will include more than the existing RTP and project lists, which will help to build consensus for implementation.	TBD
Feasibility of Innovative Freight Technologies	The objective of this study is to research potential alternative methods of transporting goods in the region, (e.g., underground tunnels, pilot-less shuttles, mono-rails, conveyer belt systems) and determine which if any of these warrant further study and consideration. The study will determine the feasibility of implementing such systems, and advantages and disadvantages compared to current forms of goods movement such as costs to shippers, capital, operating, and maintenance costs, time savings, and community, congestion and air quality impacts.	TBD
Study of Freight Movement by High Speed Rail	Conduct a study of the potential for high-speed rail (MagLev or other technology) to serve as an economically viable means of transporting freight across the SCAG region.	TBD
Missing Link Trucks	The purpose of this project is to determine the truck traffic impact on the Arroyo Verdugo Subregion should the I-710 gap closure project be completed.	TBD
2% Strategy: Logistics Infrastructure & Growth Consensus	To identify a goods movement pilot project that would demonstrate and advance the goals and objectives of the Compass 2% Strategy.	Completed

Table 2 (continued)
Goods Movement Programs and Studies

Partnerships with Other Agencies		
State Goods Movement Action Plan	A partnership between the State BT&H and Cal/EPA to bring stakeholders together address the movement of goods and reducing associated environmental impacts in California. Phase I focuses on the "why" and "what" of California goods movement needs. Phase II work addresses infrastructure, environmental impact mitigation, innovative and alternative financing, homeland security and public safety, and community impact mitigation, and workforce development.	TBD
Multi-County Goods Movement Action Plan	The objective of the Multi-County Goods Movement Action Plan is to work with the County Transportation Commissions and Caltrans to develop a regional consensus and framework for improving the goods movement system, which includes the ports, trucking, freight rail, inter-modal facilities, and air cargo, etc., as well as mitigating negative community and environmental impacts.	3/07
Southern California National Freight Gateway Strategy MOU	Establish a formal process through which state and federal agencies would share responsibility and work collaboratively with Southern California transportation agencies to address the region's infrastructure needs, environmental effects, and community impacts of increasing goods movement through the "Southern California National Freight Gateway," which extends from the San Pedro Bay Ports to the cities of Barstow and Indio, California	4th Qtr. 2006
Sub-Regional COG Studies		
I-710 EIR/EIS	To provide regional technical planning support to the multi-jurisdictional planning team and to satisfy the detailed questions/issues stemming from the completion of the LPS in the areas of corridor-wide and micro-level traffic forecasting, air quality impacts/mitigations (near term strategies and action plan, and conformity determination) and public involvement/outreach as appropriate.	TBD
Gateway Cities COG - Sub-Regional and Inter-Regional Goods Movement Study	Integration of Goods Movement Freight Corridors/Truck Lane Facilities into a system-wide freight corridor/truck lane system.	6/07
South Bay Cities Council of Governments - South Bay Harbor Freeway Goods Movement	Working with the POLB/POLA/LAWA and other groups such as the Multi-County Goods Movement Advisory Committee, the SBCCOG perform traffic pattern analyses that review the impacts of growth at the ports and the planned improvements on the Harbor Freeway and adjacent arterials to address that growth.	6/07
Gateway Cities COG - Goods Movement Strategies	Explore potential strategies for goods movement projects as well as linking transportation to land use within corridors	Completed
Coachella Valley Association of Governments - Southeast Bypass Routing Study	To determine the feasibility of constructing a bypass route extending from the I-10 at Blyth northwest to the I-40 at Ludlow.	Completed

Environmental Mitigation Plan for Goods Movement

This SCAG study will determine how $10 billion could best be spent to bring about improved air quality in the region by reducing emissions from the goods movement sector. Specifically, the study will identify potential control measures for goods movement sources, including ocean-going vessels, harbor craft, cargo handling equipment at marine terminals and intermodal yards, locomotives, and trucks. Among the potential emission reduction strategies, the study will evaluate the relative costs and effects of electrification of rail and highway (truck) facilities. The consultant will rank these measures according to effectiveness (tons of pollution reduced) and cost-effectiveness (dollars per ton) and estimate their cumulative impact on the region's air quality. The analysis will determine whether $10 billion will be enough to achieve a "fair share" of emissions reductions from the goods movement sector relative to the PM2.5 and 8-hour ozone attainment demonstrations or whether more funds will be needed and what additional measures must be taken.

The $10 billion figure is derived from SCAG staff and consultant work on goods movement. This work has established that the private sector finds substantial value in the use of goods movement infrastructure in our region, both existing and planned. As long as this value (productivity gain) is realized, it is unlikely that the region would lose a great deal of trade volume to other areas even if private user fees are adopted to finance new infrastructure. With the revenue that could be raised in this manner, as much as $36 billion in total could be financed for freight rail and truck facilities, as well as mitigation of the substantial environmental impacts of goods movement. Since the estimated regional total need for goods movement infrastructure is approximately $26.2 billion, about $10 billion could be dedicated to environmental improvements.

Final results of this study are expected in June 2007.

Multi-County Goods Movement Action Plan

Through this effort, local transportation planners have chosen to collectively address how freight can be moved to and through Los Angeles and its neighboring counties of Orange, Riverside, San Bernardino, Ventura, Imperial and San Diego, without disproportionately impacting local communities and the environment. Project partners are:

- Los Angeles County Metropolitan Transportation Authority (Metro)
- Orange County Transportation Authority (OCTA),
- Riverside County Transportation Commission (RCTC)
- San Bernardino Associated Governments (SANBAG)
- Ventura County Transportation Commission (VCTC)
- San Diego Association of Governments (SANDAG)
- Caltrans: Districts 7, 8, 11 and 12
- Southern California Association of Governments (SCAG)

The study began in July 2005 with Los Angeles County Metropolitan Transportation Authority ("Metro"), as the administrative lead. The mission of the action plan is to partner with the private sector in the development of a strategy and implementation plan for an improved regional goods movement system that:

- Ensures the efficiency and reliability of freight movement
- Maximizes both the economic opportunities associated with goods movement, as well as opportunities to reduce the associated environmental and community impacts
- Complements local and regional economic goals
- Includes innovative funding strategies
- Encourages coordination and cooperation among the implementing agencies, both public and private

This effort is intended to be a consensus strategy and implementation plan for the Southern California goods movement system. Specific objectives include: document existing freight movement systems and constraints; identify projected goods movement growth and trends, and possible private sector responses; identify strategies to lessen community and environmental impacts; identify optimal short-term and long-term infrastructure and operational strategies/projects; identify private- and public-sector roles in implementation, and funding sources; and identify partnership opportunities and solutions for implementation and needed public-private institutional arrangements

As mentioned above, the scope of this effort includes an evaluation of the environmental impacts of goods movement, including air quality impacts, in the region. The effort will result in an Action Plan that contains a full range of strategies and options (short, mid and long-term) that can be implemented for the region as a whole, as well as the individual counties, including strategies to reduce air quality impacts from this sector.

It is expected that this joint effort will be completed in 1st quarter 2007, and its findings and recommendations will be incorporated into the 2007 RTP.

Innovative Goods Movement Technologies

For centuries, freight has been moved by transport technologies such as locomotives on rail and trucks on road, both of which use diesel fuel. Except for the advent of containerization three decades ago and intermodalism (i.e., the use of multiple modes of transportation [locomotive rail, ocean carrier, and heavy-duty trucks along the supply-chain]), today's freight technologies and their pathways have remained relatively unchanged. On-road trucks, in particular, continue to be an integral and important component of Southern California's goods movement system. Almost all of the short-haul and a significant share of medium and long-haul movement of goods occur by truck. In addition, a significant share of freight is moved through the region and out of state by diesel locomotives on rail.

As discussed above, there are health and environmental issues as well as issues of congestion and system inefficiency that create a compelling public interest to look at alternative freight

transport technologies. As such, various forms of alternative freight transport systems have been proposed that are intended to supplement or replace current truck and rail transportation. The proposed technology systems could potentially generate system benefits relative to conventional truck and rail transport such as increased port throughput capacity, reduced highway and rail congestion, reduced emissions and energy use, and lower operating costs through automation and increased efficiency.

This section provides an overview of three basic types of conceptual designs: 1) Linear Induction Motor Systems; 2) Automated Truck Platoons; and 3) Automated Rail Vehicles. There may be other emerging technologies that are not listed here, but are likely to be variations of those listed below. It should again be noted that SCAG will be conducting a feasibility study of these and other alternative freight technologies for possible application in the region. The study will identify and evaluate potential alternative methods, alignments and technologies for transporting goods within the SCAG region.

Linear Induction Motor Systems

Linear induction motor (LIM) systems typically use a girder-like monorail to support or suspend a container-carrying vehicle. Linear induction motors use electromagnetic force to produce linear mechanical force, rather than torque as in typical rotary electric motors. Vehicles that use linear induction motors can have contact with the guideway through the wheels (they may also levitate on the cushion of air between magnets mounted on the guideway and others on the vehicle, often referred to as "magnetic levitation" or "maglev" technology). LIM allows for a very simple electric propulsion system with few moving parts. The four types of LIM systems described in this section are: freight shuttles, Auto-Go, GRail, and Maglev.

Freight Shuttle

One LIM concept, called the *"Freight Shuttle"*[4], consists of an automated vehicle, a specially designed guideway, a linear induction propulsion system, and a control system (Exhibit 1). This system is envisioned as fully automated and unmanned, shifting the complexity to the central control system. The Freight Shuttle is envisioned as running in a loop between a marine terminal and an inland terminal.

[4] *The Freight Shuttle: The Crisis in Freight Transportation and The Opportunity for a Green Alternative*, Stephen S. Roop, Ph.D., Texas Transportation Institute, Texas A&M University, 2006

Exhibit 1: Freight Shuttle LIM System

Note that Exhibit 1 shows the Freight Shuttle guideway at ground level in the marine or inland terminal. Fixed girder-like guideways have the disadvantage of presenting a barrier to terminal circulation.

The Freight Shuttle concept requires an exclusive, grade-separated right-of-way as it is not compatible with other systems or with driver-guided vehicles. Exhibit 2 shows the Freight Shuttle in a freeway median, a common concept for fixed-guideway systems. Since the floor of the Freight Shuttle vehicle would likely be approximately the same height as a container chassis, it should fit under freeway and surface overpasses.

Exhibit 2: Freight Shuttle in Freeway Median

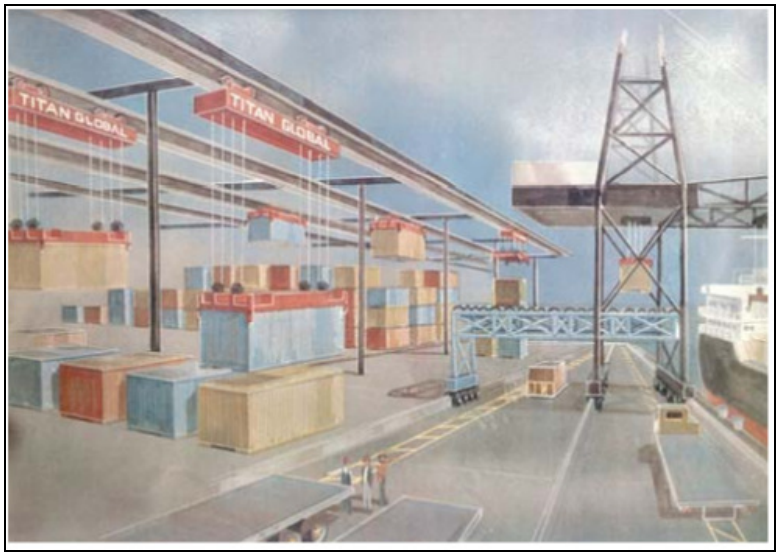
Auto-GO

Titan Global Technologies Ltd., a New Jersey based company, developed a suspended freight monorail concept that utilizes linear induction motors called Auto-GO**.** Auto-GO is an overhead cargo container handling system with fully automated single-container shuttles using linear induction motors (Exhibit 3). The Auto-GO system envisions container vehicles suspended from a girder system, each vehicle equipped with a spreader bar and cables to lift and drop containers at the terminals. This system would also be fully automated.

Exhibit 3: Auto-GO System over Highway

The transportation process would start inside the terminal where a gantry crane drops off the container (Exhibit 4). A cargo carrying system that is integrated with the carrying vehicle picks up the container and raises it by means of a specially designed bogie-spreader bar combination. The container is then secured under the container shuttle, and transported at 50 to 75 mph to its final destination.

Exhibit 4: Auto-GO System in Terminal

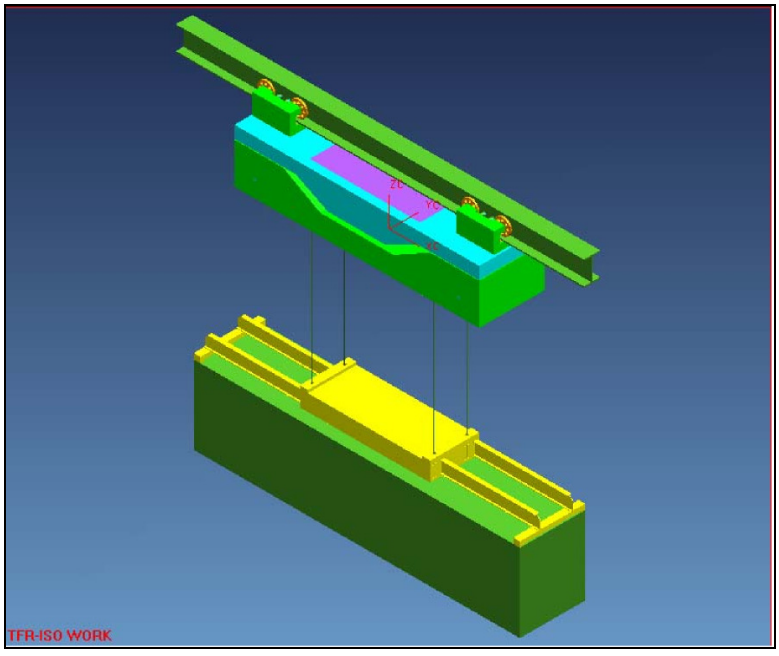


Titan has built and tested a scale model of the Auto-GO system. The technologies used in the Auto-GO system guideway, switches, and movement control system have been tested in the field and use of linear induction motors have been proven in operation of the monorail people-movers that Titan built in Miami, Florida; Pomona, California; and Dallas, Texas.

GRail

An Illinois Institute of Technology team developed a conceptual intra-yard GRail (Grid-Rail) system that utilizes linear induction motor technology. (Exhibit 5)

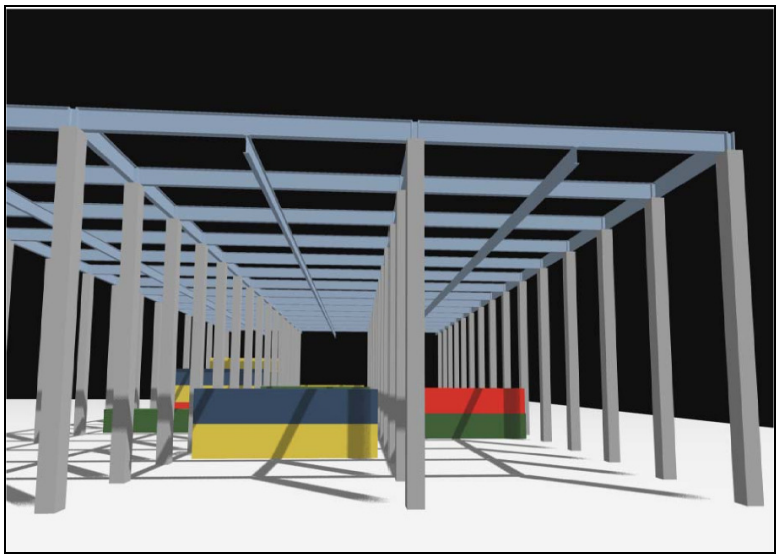
Exhibit 5: GRID Rail (GRAIL) Concept



Much of this concept was developed over a period for Sea-Land Corporation by August Design, Inc., originally for ship-to-shore application, and was not widely documented until 2000. Exhibit 6 shows the elevated Grail grid structure, similar to the Auto-GO concept shown in Exhibit 4.

The team also designed an elevated structure to move containers between terminals using a LIM vehicle. This between-yard structure provides for connecting freight nodes and allows for expansion capability by providing space for the under-hung GRail shuttle.

Exhibit 6: GRAIL Terminal Grid Structure



Maglev Systems

By adding magnetic levitation to LIM propulsion, Maglev proposals offer reduced friction, reduced noise, and higher speeds (Exhibit 7). These systems are also envisioned as fully automated. TransRapid International (a joint venture between Siemens and Thyssen-Krupp) is perhaps the farthest along in developing a Maglev container transport concept. TransRapid envisions a dedicated express container system connecting the ports to the Inland Empire, to Victorville, and to Beaumont, with capacity for five million containers per year.

The Center for the Commercial Deployment of Transportation Technologies (CCDoTT) at California State University, Long Beach, has considered a number of rights-of-way for a Maglev system. An important consideration with respect to right-of-way is the ability of Maglev freight systems to climb steep grades. The freight Maglev system is claimed to be able to carry containers up a 6% grade, versus 3% for conventional rail. The 6% claimed maximum grade for freight Maglev matches the maximum grade on Interstate highways, suggesting Maglev rights-of-way along interstate medians (assuming such medians are available).

Exhibit 7: Detailed View of General Atomic's EDS Maglev Design

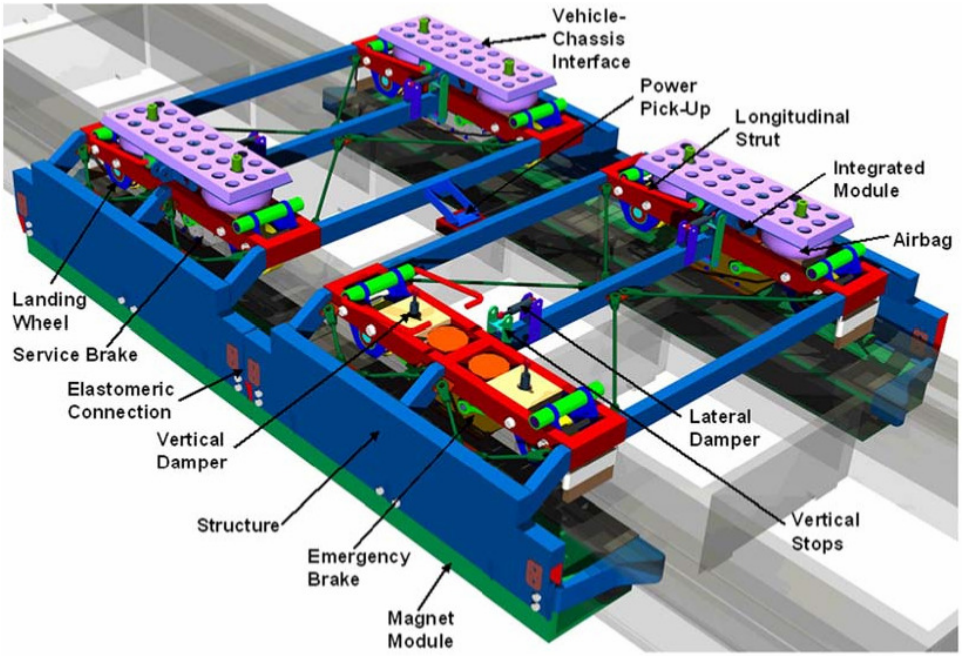
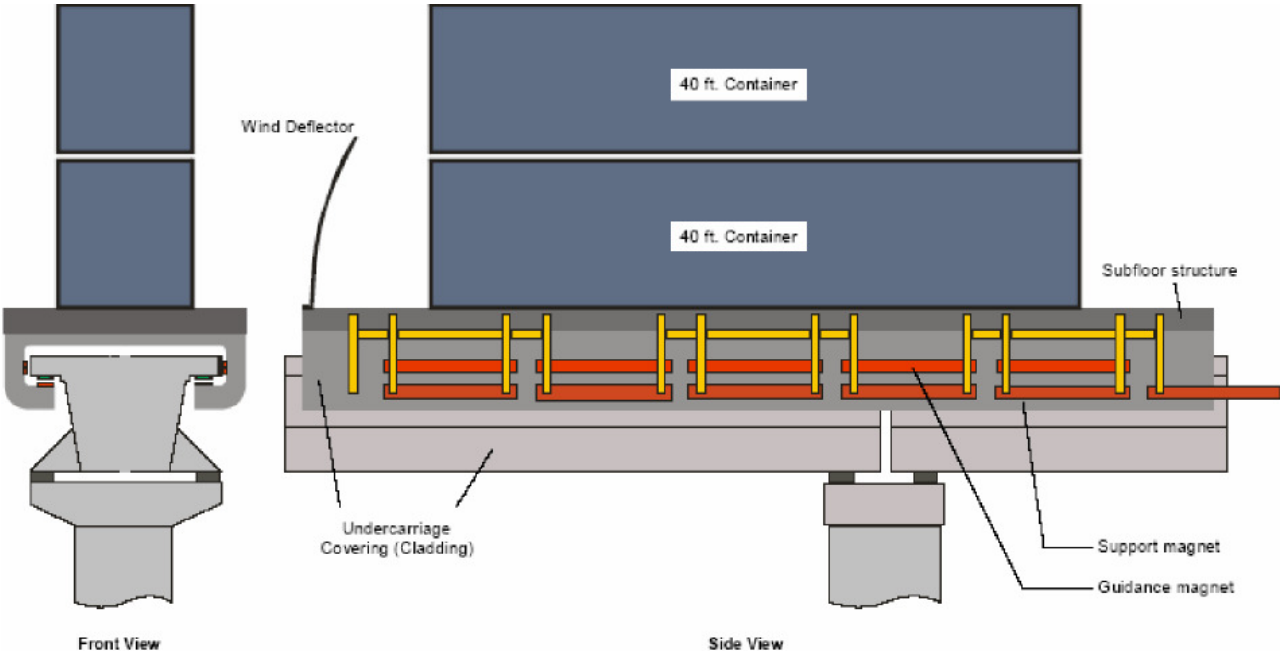


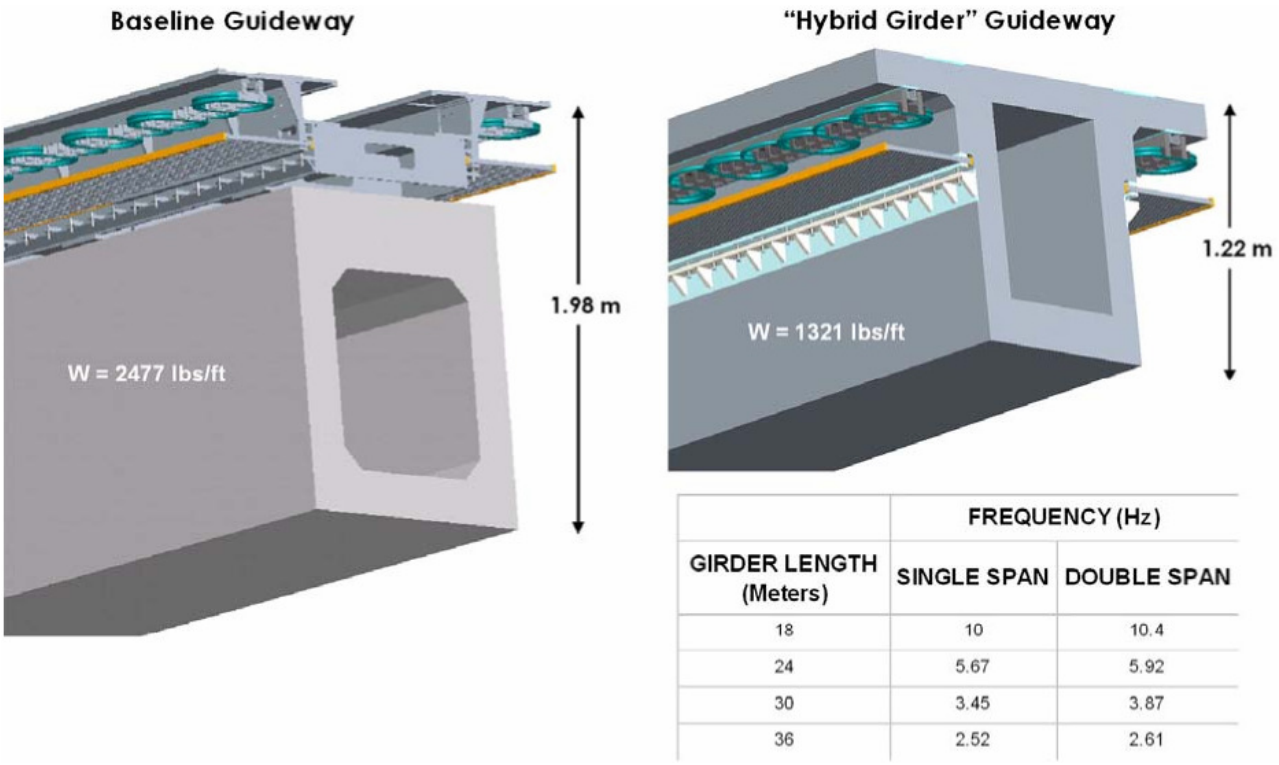
Exhibit 8 shows the TransRapid freight design in a double-stack configuration.

Exhibit 8: TransRapid Maglev Concept



The combined height of guideway (Exhibit 9), vehicles (Exhibit 7), and two high-cube (9'6") containers would be 25' – 27', meaning a double-stack Maglev system would not fit under Interstate overpasses. A single-stack Maglev system would be 15' – 17' high, and would have to be depressed in the median to fit under most freeway overpasses.

Exhibit 9: TransRapid Maglev Guideway Concepts



	FREQUENCY (Hz)	
GIRDER LENGTH (Meters)	SINGLE SPAN	DOUBLE SPAN
18	10	10.4
24	5.67	5.92
30	3.45	3.87
36	2.52	2.61

Exhibit 10 shows a conceptual Maglev system linking a single port terminal with an inland terminal. The design shows two-unit and four-unit Maglev vehicles, instead of the single vehicles in most system proposals. The diagram also reflects the need for crossovers, maintenance facilities, and storage facilities ignored by other, less detailed proposals.

The terminals shown in Exhibit 10 include marshalling areas and "container storage/retrieval systems". Note that only one port terminal and only one terminal are shown. The system complexity would increase dramatically if the system were to serve multiple terminals on each end.

In common with the other fixed-guideway proposals the Maglev system may require completely rebuilding or replacing existing marine terminals. Exhibit 11 shows a terminal concept developed by TransRapid. The automatic container storage/retrieval system has not been designed, although several concepts have been developed by other authors for similar systems, none have been built. Each terminal served by the Maglev system would need a comparable system.

Exhibit 10: TransRapid's Port to Inland Intermodal Layout

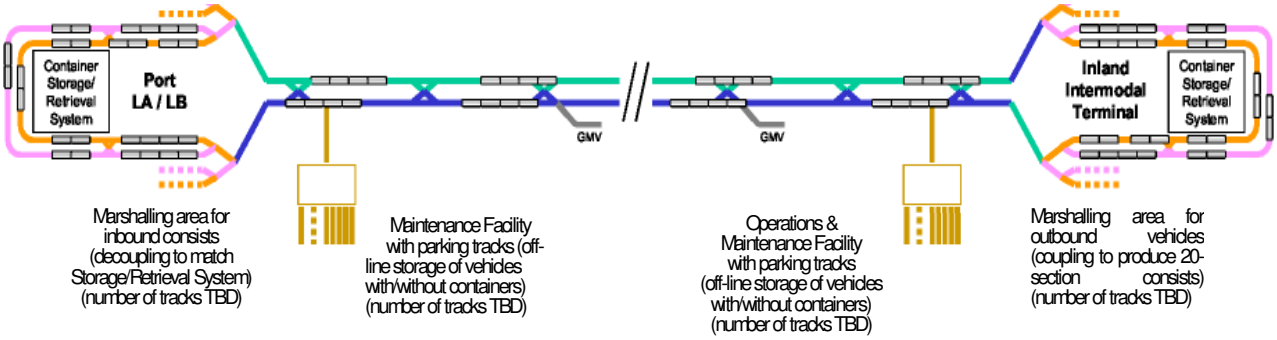


Exhibit 11: Maglev Terminal Concept

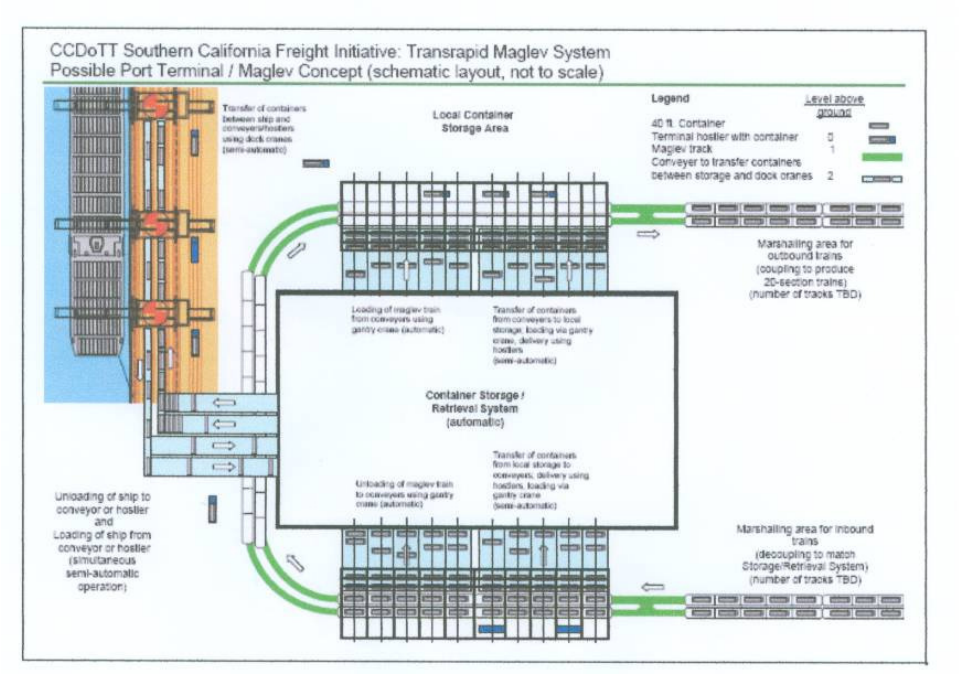
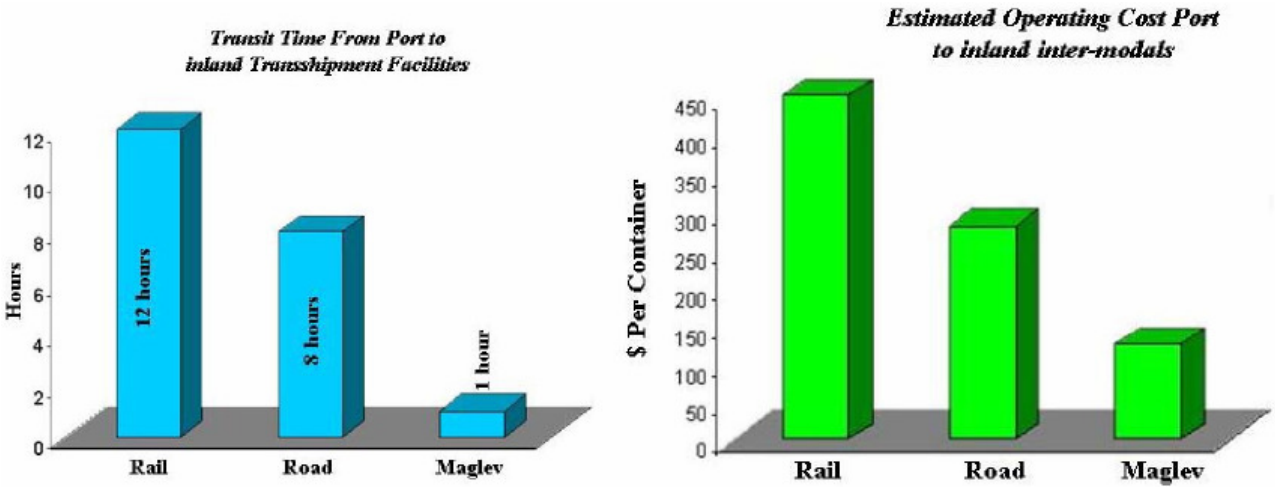


Exhibit 12 shows estimates of relative transit times and operating costs for a 100-mile trip.

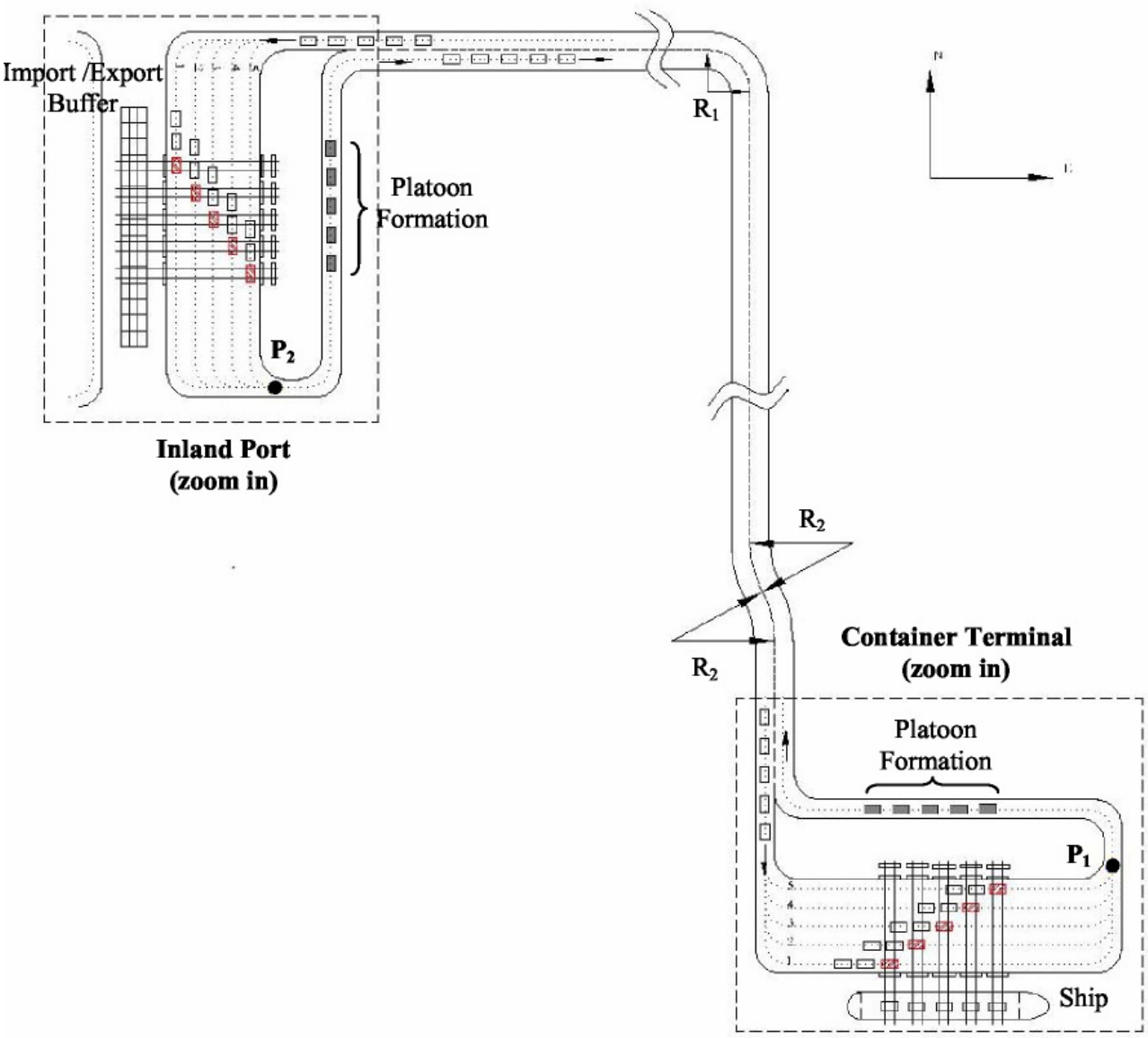
Exhibit 12: Proponents' 100-mile Transit Time and Cost Estimates



Automated Truck Platoons

Another approach for transporting goods calls for groups of remote controlled, automated trucks traveling on exclusive roads. The proposed system (Exhibit 13) includes reconfigured marine and inland terminals with automated multi-lane cranes.

Exhibit 13: Conceptual Automated Truck Platoon System



Automated guided vehicles (AGVs) have been proposed and studied in several instances. The Delta Terminal at the Port of Rotterdam has been operating AGVs to transport containers within the terminal, while other European and Asian ports are reportedly experimenting with similar systems.

The system proposed for port to inland trip is much more ambitious. Since the automated trucks would be required to transport containers between a port and an inland port some distance away, they will need to travel at much higher speeds than the AGVs operating inside container

terminals. The Center of Transport Technology in the Netherlands studied a container transport system, called "Combi-Road", in which each container is pulled on a semi-trailer of an unmanned vehicle, and the vehicles are electrically driven along specially designed tracks. The proposed system is composed of automated trucks, automated cranes and a central control system. The central system would contain all the information on transportation tasks and road geometry, acquire real time information, and issue commands for all of the trucks, cranes, etc.

Automated trucks would transport containers on a dedicated road. Inside the terminals containers would be handled by automated cranes. An automated truck would be issued commands for carrying a container from the inland port, joining a platoon, speeding up to a desired speed, cruising while on the road, slowing down when entering the container terminal, positioning itself under a quay crane for unloading, then repeating the cycle.

It is envisioned that all import containers would be transported to the inland port before they are distributed to different destinations, and all the export containers would be processed in the inland port before they are transferred to the container terminal.

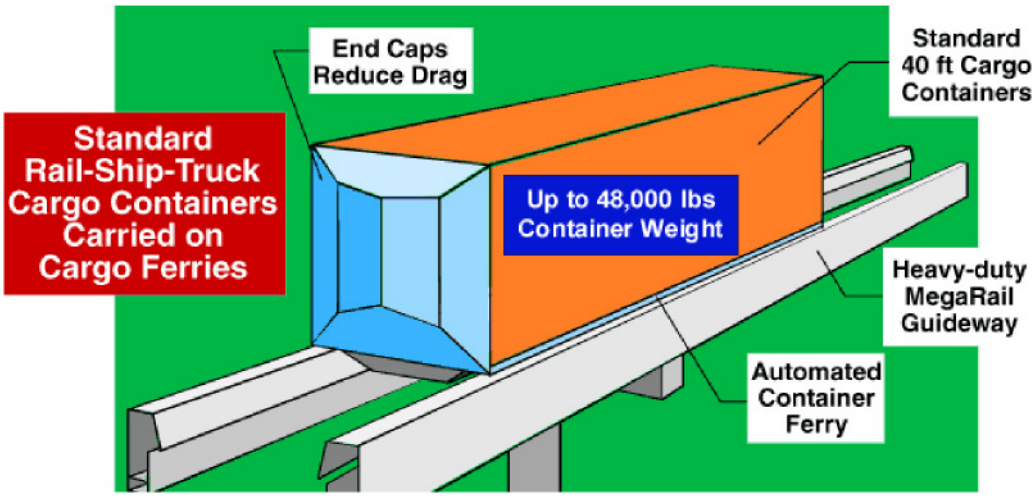
Currently, this system is strictly conceptual. Simulations of its performance connecting one marine terminal to one inland port have been conducted, but none of the equipment has been designed or demonstrated and more complex multi-terminal operations have not yet been addressed.

Automated Rail Vehicles

CargoRail

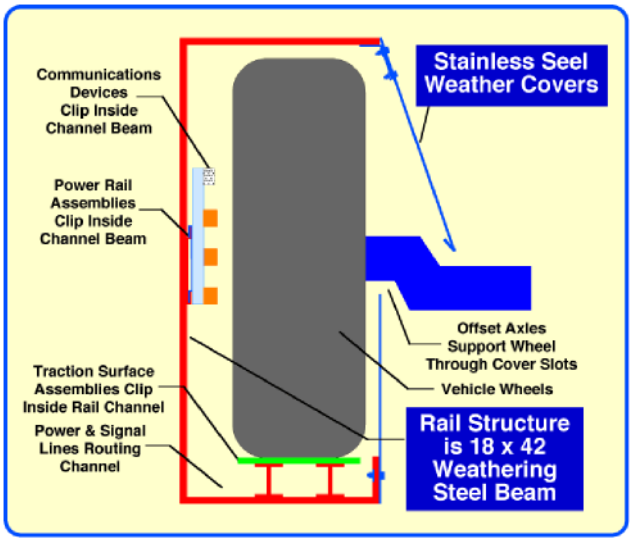
The CargoRail concept developed by the MegaRail Transportation Systems, Inc. employs rubber-tired vehicles (referred to as "Cargo Ferries") that would move along an exclusive elevated guideway (Exhibit 14).

Exhibit 14: CargoRail System



Each vehicle would operate individually, but would be fully automated and centrally controlled. Vehicles would operate on an enclosed weatherproof guideway (Exhibit 15).

Exhibit 15: CargoRail Guideway Concept



MegaRail Transportation Systems claims that this system is ready for a non-stop, 24-hour, 7-day a week operation at operational speeds of up to 75 mph. The maximum designed payload per vehicle is 50,000 lbs. This proposal appears to be derived from MegaRails' similar proposals for people movers.

CargoMover

Another proposal calls for automated vehicles operating over conventional railroad tracks, each carrying a single container (Exhibit 16). A variation on this proposal would equip each vehicle to load or unload itself. CargoMover technology is designed to utilize the European and wireless control systems, which are currently being deployed on several railway systems in Western Europe. CargoMover can also operate in conjunction with other train control systems. Siemens is currently testing several CargoMover vehicles.

Exhibit 16: Seimens Transportation CargoMover

Cost Analysis

While cost estimates for many of the technology options referenced above are not readily available, recent studies include limited investment cost evaluations which provide an order of magnitude in terms of capital and operating cost structures for such systems.

The CCDoTT, for example, conducted a feasibility study of a high speed intermodal corridor from the ports of Los Angeles/Long Beach out to the Inland Empire (Victorville and Beaumont). The lower end of the cost range in Table 3 reflects CCDoTT's preliminary estimate for a Maglev-Freight system. The higher end of the cost range assumes additional cost adjustments per SCAG's initial review of CCDoTT's findings.

Table 3
Preliminary Cost Estimate for Maglev-Freight System

Cost Category	Cost Range
Capital Cost 200 track-mile Maglev-freight system to Victorville and Beaumont. Lower end of cost range per CCDoTT evaluation; higher end per SCAG's review—includes direct connection to port terminals and main service lines. Does not include right-of-way costs and does not include car costs.	$26 billion to $28 billion
Operating Cost Lower end of cost range per CCDoTT evaluation at $40 per container plus $110 per load/unload lifts; higher end of cost range per SCAG's review—adjusts for prevailing market lift rates, round trip operating costs, depreciation, and final dray costs. Does not include maintenance costs.	$150 per container to $440 per container

The CCDoTT study cites a number of cost considerations for analyses including vehicle capital cost, guide-way infrastructure, cost of energy supply, right-of-way and environmental considerations as well as operations and maintenance costs.

Initial findings indicate that the overall investment cost of a freight system using Maglev technology can be comparable to that of a passenger system. In terms of vehicle capital costs, configurations may change to accommodate freight, however, there may be offsetting cost factors such as length of freight vehicles (can be shorter) and on-board equipment (not necessary for freight service). Accordingly, the cost per section of freight vehicles is less than that of passenger vehicles. Nevertheless, the total number of sections needed to accommodate the volume of goods moving through the southern California region would be substantial.

Guideway infrastructure would require slightly different configurations due to higher loads. But the overall design and construction would be simpler than that of passenger systems. Further, CCDoTT estimates that the cost of energy supply and propulsion system for freight would be comparable to passenger systems. Right-of-way and environmental considerations would be less for freight—requiring slightly smaller horizontal clearance; also, a freight system would be traveling at lower speeds than passenger service, thereby minimizing the need for noise protection measures along the route.

Finally, CCDoTT's preliminary cost considerations indicate that freight terminals would need to be highly automated such that operating personnel costs would not be significant; nevertheless more maintenance personnel would be necessary due to the greater number of substations needed for freight. In addition, because the systems involve automated control of unmanned vehicles, the costs of vehicle control systems is not known. Furthermore, it is not clear what the cost of assembling and acquiring right-of-way needed to construct these systems would be.

These are all significant cost considerations that need to be fully analyzed in detail; additionally, studies need to be initiated to gauge costs associated with the reconfiguration of terminals that would accommodate proposed alternative technology systems. Overall, a comprehensive evaluation of the costs and benefits of alternative freight technology options is needed to help guide decision-makers as they evaluate strategies to optimize the region's goods movement transportation system.

Next Steps

Studies are currently underway or will begin in the near future to further assess the potential of alternative freight technologies and determine the extent to which such technologies offer advantages over conventional truck and rail transportation in terms of shipping time and reliability, congestion and environmental mitigation, and cost.

The first is the SCAG Inland Port Feasibility Study, which will not analyze specific technologies but will instead examine the additional options for inland port locations, configurations, or functions that an alternative freight technology system may create. This study is currently in progress and is expected to be completed by June 2007.

The second is the Ports of Los Angeles and Long Beach Advanced Cargo Transportation Technology Evaluation and Comparison (ACTTEC) study, which is currently in the Request for Proposals (RFP) process. This study will evaluate the use of advanced technologies for moving containers from the Ports relative to conventional truck drayage with the goal of supporting sustainable operations while improving the quality of life in the communities around the Ports and along the major goods movement corridors.

The third is a SCAG study on the Feasibility of Innovative Freight Technologies, which will build on the work conducted in the ACTTEC study and examine the potential of alternative technologies to transport marine containers, as well as other non-port related goods, to locations in the SCAG region. It is expected that an RFP for this study will be released in fall 2006.

Finally, it is anticipated that a study of container movements via alternative freight technologies will be conducted as part of the I-710 Environmental Impact Report (EIR)/Environmental Impact Study (EIS).

TRANSPORTATION CONTROL MEASURES

Background

TCMs are defined as strategies that adjust trip patterns or otherwise modify vehicle use in ways that reduce air pollutant emissions, and which are specifically identified and committed to in the most recently approved AQMP/SIP. TCMs are included in the AQMP as part of the overall control strategy to demonstrate the region’s ability to come into attainment with the NAAQS.

Historically, the majority of emission reductions from mobile sources have come from technological improvements in vehicle engines and fuel, which are stipulated by U.S. EPA and CARB. By law, and according to the Transportation Conformity Rule, vehicle technology-based, fuel chemistry-based and fleet maintenance-based measures cannot be considered as TCMs for timely implementation purposes.

A definition of TCMs is provided in EPA's Transportation Conformity Rule - 40 CFR Parts 51 and 93:

> Transportation control measure (TCM) is any measure that is specifically identified and committed to in the applicable implementation plan that is either one of the types listed in §108 of the CAA, or any other measure for the purpose of reducing emissions or concentrations of air pollutants from transportation sources by reducing vehicle use or changing traffic flow or congestion conditions. Notwithstanding the above, vehicle technology-based, fuel-based, and maintenance-based measures which control the emissions from vehicles under fixed traffic conditions are not TCMs for the purposes of this subpart.

The Rule also defines the criteria and procedures for timely implementation of TCMs as follows:

> §93.113 Criteria and procedures: Timely Implementation of TCMs
>
> (c) For TIPs, this criterion is satisfied if the following conditions are met:
>
> (1) An examination of the specific steps and funding source(s) needed to fully implement each TCM indicates that TCMs which are eligible for funding under title 23 U.S.C. or the Federal Transit Laws are on or ahead of the schedule established in the applicable implementation plan, or, if such TCMs are behind the schedule established in the applicable implementation plan, the MPO and DOT have determined that past obstacles to implementation of the TCMs have been identified and have been or are being overcome, and that all State and local agencies with influence over approvals or funding for TCMs are giving maximum priority to approval or funding of TCMs over other projects within their control, including projects in locations outside the nonattainment or maintenance area.
>
> (2) If TCMs in the applicable implementation plan have previously been programmed for Federal funding but the funds have not been obligated and the TCMs are behind the schedule in the implementation plan, then the TIP cannot be found to conform if the funds intended for those TCMs are reallocated to projects in the TIP other than TCMs, or if there are no other TCMs in the TIP, if the funds are reallocated to projects in the TIP other than projects which are eligible for Federal funding intended for air quality improvement projects, e.g. the Congestion Mitigation and Air Quality Improvement Program.
>
> (3) Nothing in the TIP may interfere with the implementation of any TCM in the applicable implementation plan.

CAA Section 108(f)(1)(A)[5] lists the following sixteen measures as illustrative of TCMs.

i. Programs for improved use of public transit;
ii. Restriction of certain roads or lanes to, or construction of such roads or lanes for use by, passenger buses or high occupancy vehicles;
iii. Employer-based transportation management plans, including incentives;
iv. Trip-reduction ordinances;
v. Traffic flow improvement programs that achieve emission reductions;
vi. Fringe and transportation corridor parking facilities, serving multiple occupancy vehicle programs or transit service;
vii. Programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration, particularly during periods of peak use;
viii. Programs for the provision of all forms of high-occupancy, shared-ride services, such as the pooled use of vans;
ix. Programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;
x. Programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;
xi. Programs to control extended idling of vehicles;
xii. Programs to reduce motor vehicle emissions, consistent with Title II of the Clean Air Act, which are caused by extreme cold start conditions;
xiii. Employer-sponsored programs to permit flexible work schedules;
xiv. Programs and ordinances to facilitate non-automobile travel, provision and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity;
xv. Programs for new construction and major reconstruction of paths, tracks or areas solely for the use by pedestrian or other non-motorized means of transportation, when economically feasible and in the public interest; and
xvi. Programs to encourage the voluntary removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks.

In addition to the measures listed above, other measures may be considered as TCMs if they reduce emissions or concentrations of air pollutants from transportation sources by modifying vehicle use, changing traffic flow, or mitigating traffic congestion conditions. TCMs may be voluntary programs, incentive-based programs, regulatory programs, as well as market- or pricing-based programs.

Based on suggestions received from interagency consultation and discussions with transportation and air quality stakeholders via the Transportation Conformity Working Group (TCWG), SCAG formally refines the types of projects to be included as TCMs as appropriate during the AQMP/SIP and/or RTIP and RTIP Guidelines development process. During the regular update cycle for each of the listed documents, SCAG, in coordination with the TCWG, will refine and

[5] See: http://www.epa.gov/oar/caa/contents.html

revise TCM descriptions and definitions in order to clarify the general TCM process as well as resolve specific implementation issues. It is SCAG's aim to work with County Transportation Commissions (CTCs),air quality stakeholders, and any other interested parties, primarily through the TCWG, to facilitate the TCM process and implement TCMs appropriately.

It is SCAG's responsibility to ensure that TCM strategies are funded in a manner consistent with the implementation schedule established in the RTIP at the time a project is identified as a committed TCM. The transportation conformity process is designed to ensure timely implementation of TCM strategies. If the implementation of a TCM strategy is delayed, or if a TCM strategy is only partially implemented, the emission reduction shortfall must be made up by either substituting a new TCM strategy or by enhancing other control measures through the substitution process described in this Appendix.

2007 AQMP TCMs

The TCMs included in this Appendix are derived from the TCM projects listed in the first two years of the 2006 RTIP. The RTIP is the short-range vehicle used to implement the goals and objectives of the long-range RTP. The 2006 RTIP includes projects committed as TCMs in previous RTIPs but not yet completed as well as new TCMs. A list of the TCM projects can be found in Attachment A of this Appendix.

The enforceable commitment for the TCMs is to fund and implement projects and programs contained in the first two years of the current six-year RTIP. The remaining four years of the RTIP represent expectations in project scope and design only. The TCM projects in the RTIP are based on the projects planned in the RTP, which has a time horizon of 20 years. A full, illustrative list of these RTP projects can be found in Technical Appendix I of the 2004 RTP and Attachment B of this Appendix. Although the specific mix of projects to be funded with future RTIP dollars may ultimately change, the emission reductions anticipated, in aggregate, from these projects, set a key benchmark in determining the transportation sector's contribution to a mobile source emission budget and its associated conformity determination.

Rollover and Substitution of TCM Projects

Each time the biennial RTIP is updated by action of SCAG's Regional Council, the entire list of TCM projects in the AQMP/SIP will be updated, and the new and continuing projects identified in the fiscally constrained first two years of the new RTIP will be rolled over into the AQMP/SIP. In the event that a specific TCM project is found to be non-implementable within the designated time frame, an appropriate TCM will be used as a substitute. In either case, the parties in the conformity rule interagency consultation process, established in the SCAG region as the TCWG, shall assess the suitability and implementability for the new TCM projects. Where a transportation control measure identified in the SIP is no longer implementable, SCAG may initiate the process described below in the section "Substitution of Individual TCM Projects" to identify and adopt a new control measures.

Rollover of TCM Projects (RTIP Update)

Approximately every two years, as the RTIP is updated, additional TCMs will be added to the AQMP/SIP TCM list based on the new RTIP and the RTIP Guidelines. This "rollover" list will include new projects in addition to ongoing projects from previous RTIPs. Completed projects (projects that have completed construction or have service in place) will be reported as complete and removed from the list. The rollover list will be monitored for adherence to the schedule established in the RTIP at the time a project is identified as a committed TCM. The identification of TCMs from the RTIP shall be agreed upon by both SCAG and the appropriate CTCs. The list of TCMs included in the AQMP/SIP appropriately does not include a timely implementation report. Timely implementation reporting is done when the RTIP is updated.

The rollover process will apply to any RTIP that requires a full conformity analysis and finding. Generally, a new RTIP is required every two years in accordance with state and federal planning requirements. However, a new RTIP can be more frequent, for example a new RTIP is required within six months of the adoption of a new RTP. The described TCM rollover process shall apply in such cases as well.

Adoption Procedures for RTIP Rollover of TCM Projects

The rollover of the RTIP must be adopted by SCAG's Regional Council, in accordance with the RTIP adoption process, as described below.

- The Draft RTIP is reviewed by various SCAG Committees, Task Forces, and Working Groups, such as the standing Transportation and Communication Committee, the Technical Advisory Committee, and the TCWG;
- Public notification is provided through major newspapers in the affected sub-regions as well as on SCAG's website;
- Draft RTIP materials are distributed, with appropriate cover letters, to approved public libraries and facilities and also made available on SCAG's website for access by the public;
- Input received is compiled and analyzed, and responses to comments are provided by SCAG Staff, and made available to the public;
- A summary of comments received during the public comment period along with SCAG's responses, following the close of the public comment period, is incorporated into the final RTIP;
- The Final RTIP is adopted by SCAG's Regional Council ; and
- SCAG's adopted RTIP is submitted to the State for funding approval and to the federal agencies (FHWA, FTA and EPA) for final funding and conformity approval.
- Upon federal approval of the RTIP, the new TCMs become part of the applicable AQMP/SIP.

Substitution of Individual TCM Projects

The CTCs and/or project sponsors shall notify SCAG when a TCM project cannot be delivered or will be significantly delayed. SCAG and the CTCs will identify and evaluate possible replacement measures for individual substitutions, through the TCWG, which includes members from all affected jurisdictions, federal, state and/or local air quality agencies and transportation agencies.

Substitution of TCMs will follow the process outlined in SAFETEA-LU. Section 6011(d) of SAFETEA-LU allows for the substitution of TCMs if certain conditions are met. These include:

"(i) if the substitute measures achieve equivalent or greater emissions reductions than the control measure to be replaced, as demonstrated with an emissions impact analysis that is consistent with the current methodology used for evaluating the replaced control measure in the implementation plan;
"(ii) if the substitute control measures are implemented-

- "(I) in accordance with a schedule that is consistent with the schedule provided for control measures in the implementation plan; or
  "(II) if the implementation plan date for implementation of the control measure to be replaced has passed, as soon as practicable after the implementation plan date but not later than the date on which emission reductions are necessary to achieve the purpose of the implementation plan;

"(iii) if the substitute and additional control measures are accompanied with evidence of adequate personnel and funding and authority under State or local law to implement, monitor, and enforce the control measures;
"(iv) if the substitute and additional control measures were developed through a collaborative process that included--

- "(I) participation by representatives of all affected jurisdictions (including local air pollution control agencies, the State air pollution control agency, and State and local transportation agencies);
  "(II) consultation with the Administrator; and
  "(III) reasonable public notice and opportunity for comment; and

"(v) if the metropolitan planning organization, State air pollution control agency, and the Administrator concur with the equivalency of the substitute or additional control measures.

In addition to the conditions above, the substitute project shall be in the same air basin and preferably be located in the same geographic area and preferably serve the same demographic subpopulation as the TCM being replaced.

A substitution does not require a new conformity determination or a SIP revision. Adoption of the new TCM in coordination with EPA concurrence will rescind the original TCM and apply the new measure.

SCAG will maintain documentation of all approved TCM substitutions. The documentation will provide the emissions analysis as well as a description of the substitution process, including a list of the committee or working group members, public hearing and comment process, and evidence of

SCAG adoption. Compliance with the provisions listed above will ensure adequate emissions reductions are achieved in a TCM substitution.

TCM Implementation

The TCM measures and strategies listed in Attachment A of this Appendix replace the TCM strategies contained in all previous AQMPs/SIPs. Table 4 provides an outline of the categories of TCMs in the 2006 RTIP and 2007 AQMP.

As outlined in Table 4, the TCMs include the following three main categories of transportation improvement projects and programs.

- High occupancy vehicle (HOV) measures,
- Transit and Systems Management measures, and
- Information-based Transportation Strategies.

In the event a question arises as to whether a specific project is a TCM, that project should go to the TCWG for clarification. The agencies and parties at the TCWG will review the project and determine whether the project meets the definition of a TCM. This process also applies in the event that a CTC, or other party, wishes to dispute a particular TCM and remove it from the RTIP and the AQMP/SIP.

Table 4
TCM Project Categories (Based on the 2006 RTIP

Project Description
A. High Occupancy Vehicle (HOV) Measures *HOV projects, and their pricing alternatives.*
▪ New HOV Lanes – Extensions and Additions to Existing Facilities
▪ New HOV Lanes – With New Facility Projects
▪ New HOV Lanes – With Facility Improvement Projects
▪ HOV to HOV Bypasses, Connectors, and New Interchanges with Ramp Meters
▪ High Occupancy Toll (HOT) Lanes and Pricing Alternatives

Table 4 (continued)
TCM Project Categories (Based on the 2006 RTIP)

B. Transit and System Management Measures *Bus, rail and shuttle transit expansion and improvements; park and ride lots and inter-modal transfer facilities; bicycle and pedestrian facilities; railroad consolidation programs such as the Alameda Corridor, grade separation projects, channelization, over-passes, underpasses; traffic signalization; intersection improvements.*
Transit
▪ Rail Track – New Lines
▪ Rail Track – Capacity Expansion of Existing Lines
▪ New Rolling Stock Acquisition – Rail Cars and/or Locomotives
▪ Express Busways – Bus Rapid Transit and Dedicated Bus Lanes
▪ Buses – Fleet Expansion
▪ Shuttles and Para-transit Vehicles – Fleet Expansion
Intermodal Transfer Facilities
▪ Rail Stations – New
▪ Rail Stations – Expansion
▪ Park & Ride Lots – New
▪ Park & Ride Lots – Expansion
▪ Bus Stations & Transfer Facilities – New
▪ Bus Stations & Transfer Facilities – Expansion
Non-motorized Transportation Mode Facilities (non-recreational)
▪ Bicycle & Pedestrian Facilities – New
▪ Bicycle & Pedestrian Facilities – Expansion
▪ Bicycle Facilities – New
▪ Bicycle Facilities – Expansion
▪ Pedestrian Facilities – New
▪ Pedestrian Facilities – Expansion
C. Information-based Transportation Strategies *Programs that promote and popularize multi-modal commute strategies to maximize alternatives to single-occupancy vehicle commute trips; marketing and promoting the use of HOV lanes or rail lines to the general public; educating the public regarding cost, locations, accessibility and services available at Park and Ride lots; promoting and marketing vanpool formation and incentive programs; promoting ride-matching services through the Internet and other means of making alternative travel option information more accessible to the general public; Urban Freeway System Management improvements; Smart Corridors System Management programs; Congestion Management Plan-based demand management strategies; county-/corridor-wide vanpool programs; seed money for transportation management associations (TMAs); and TDM demonstration programs/projects eligible for programming in the RTIP.*
▪ Marketing for Rideshare Services and Transit/TDM/Intermodal Services
▪ Intelligent Transportation Systems/Control System Computerization
▪ Telecommuting Programs/Satellite Work Centers
▪ Real-time Rail, Transit, or Freeway Information Systems (changeable message signs)

Relation of Current TCM Components to Previous Plans

The TCM components listed in the 2007 AQMP are consistent with the TCM elements proposed in previous plans, and meet the anti-backsliding requirements of Section 110(l) of the CAA. The CAA restricts EPA's ability to approve state actions that weaken the California SIP. Therefore, the requirements must strengthen the SIP and not interfere with an applicable requirement under the CAA. All TCM commitments from previous AQMPs have been implemented and documentation is provided in the Timely Implementation Reports of the 2006 RTIP and previous RTIPs. The TCMs in the 2007 AQMP continue SCAG's TCM commitment and the TCM status will be reported in the Timely Implementation Reports of subsequent RTIPs.

The 1994 AQMP lists one TCM, comprising various specific strategies (Table 5). Substantial progress has been made in implementing these measures, and the region remains committed to assuring continued implementation.

Table 5
TCMs from 1994 AQMP (TCM1*)

Transportation Improvements	Current Status
HOV Lanes	On going
Transit Improvements	On going
Park and Ride Facilities	On going - expanded to include all facilities that substantially promote transfer across modes of travel.
Traffic Signal Improvements	On going - focus is on projects that substantially improve regional system flow
Urban Freeway Systems Management Improvements and Smart Corridors	On going - Intelligent Transportation Systems/Control System Computerization
Operational Improvements (Flow improvements, Congestion relief)	On going – focus is on projects that substantially improve regional system flow
Rideshare Programs	On going
TDM Programs	On going
Bicycle Facility Improvements	On going - expanded to include pedestrian facilities as well.

* AQMP Appendix IV-C, September 1994, Pg. II-14 – II-16

In addition to the TCM strategies specified above, indirect source measures (ISRs) were also considered as TCMs in the 1994 AQMP, and were planned for AQMD rule development (Table 6). However, the legislature has reduced the AQMD's legal authority to implement ISR measures.

Table 6
Indirect Source Controls – 1994 AQMP

ISR 1	Special Event Centers	See H&S 40717.8, 1994
ISR 2	Regional Shopping Centers	See H&S 40717.6, 1995
ISR 3	Registration and Commercial Vehicles	See H&S 40717.9, 1995
ISR 4	Airport Ground Access	See H&S 40717.9, 1995
ISR 5	Trip Reduction for Schools	See H&S 40717.9, 1995
ISR 6	Enhanced Rule 1501	See H&S 40717.9, 1995
ISR 7	Parking Cash-Out	See H&S 40717.9, 1995

A key step in the 1994 AQMP was the proposal for the formation of the Southern California Economic Partnership (SCEP, or The Partnership), intended to help develop many of the innovative and conceptual projects envisioned at that time. It should be noted that The Partnership has been established as an active and effective entity, and is vigorously pursuing these and other projects. These include: Intelligent Transportation Systems (ITS), Smart Shuttles, Telecommunications, Telecommuting Support, Alternative Fuel Vehicle Support and Voluntary Emission Reduction Program, the Clean Cities Program, and the Travel Advisory News Network (TANN) Project (see 2007 AQMP, Chapter 4 and http://www.the-partnership.org/index.htm).

TCM Enforceability and Monitoring

The TCM strategies contained in the AQMP are expected to be real, quantifiable, and enforceable. The region's long-range transportation blueprint (the previously triennial and now quadrennial RTP) and the shorter-term programming used to fund the improvements (the RTIP) together form the foundation and the keystone for improving transportation system performance while at the same time assuring the timely attainment of air quality goals within the Basin. Assessing the consistency of emissions deriving from these mobility strategies against the corresponding mobile source emission budgets contained in the applicable SIP serves as the basis for determining conformity to the SIP. The RTIP provides the information needed in assuring the timely implementation of TCM strategies described in this document.

The projects and programs that make up the RTP and RTIP form the basis for assuring an enforceable commitment for each TCM. Federal law requires that funding priority be given to TCMs in developing the RTIP. Therefore, the report on the timely implementation of TCMs will continue to serve as one of the methods of monitoring the air quality impacts of transportation system improvements.

The 2006 RTIP provides for timely implementation of the TCM strategies for the Basin. As the biennial element of the RTIP is revised, the list of fiscally constrained projects, or, rather, the list of projects for which funding has been identified, is updated. The U.S. EPA Transportation Conformity Rule states that timely implementation is to be measured against the TCM strategies in the applicable implementation plan.

The enforceable commitment for TCM measures is to report on the funding and implementation of the first two years of the six-year biennial RTIP. The list of fiscally constrained projects will advance, or "roll forward", and the enforceable commitment will automatically be revised to encompass the first two years of the constrained projects contained in each new RTIP. The implementation status of TCM projects is reported on in subsequent RTIPs until the TCM projects have been reported as completed. In projecting the long-term (2010, 2020, etc.) impacts which could be ascribed to this measure in the Plan, the facilities proposed to be built in the long-term timeframe, and programs as they exist today, serve as the basis for modeling travel and emission impacts.

REGIONAL TRANSPORTATION EMISSIONS

Based on the data generated from SCAG's Transportation Demand Model (e.g., traffic volumes, vehicle speeds, transit ridership, etc.), an estimate of emissions associated with on-road mobile sources can be generated using CARB's emission factor model (EMFAC). Through this process, future emissions from on-road mobile sources can be compared for the regional transportation system assuming implementation of the RTP versus a baseline case without RTP implementation.

One of the key goals of conventional transportation planning has been the provision of sufficient roadway capacity to reduce congestion and improve mobility through improvements to regional networks of highways and arterials. And, to the extent that congestion is relieved, there are significant regional air quality benefits to such flow-improving interventions. Thus, the emissions benefits historically demonstrated in previous AQMPs and air quality analyses performed for the RTP and the RTIP have been based on the congestion relief effects associated with both added infrastructure capacity and implementation of TCMs. It is generally understood, however, that potential future improvements in air quality deriving from the RTP and TCMs will be minimal, since motor vehicle emissions have and will continue to be substantially reduced through technology (i.e., emission standards for new engines and in-use standards for existing fleets). For instance, the emissions of ROG go from approximately 300 tons per day in 2005 to approximately 82 tons per day in 2030.

The modeling exercise performed for the Draft 2007 AQMP demonstrates a decrease in ROG, CO, and PM2.5 emissions from on-road mobile sources for the milestone years of 2010, 2015, 2020, and 2023. However, while NOx emissions decrease in the year 2010, the currently available emissions model (EMFAC2002) predicts NOx increases in the milestone years 2015, 2020, and 2023 (see Table 7)

The increase in NOx emissions is attributed to heavy duty trucks. Based on the best data available at the time the EMFAC2002 was developed, this emissions model includes a NOx "speed curve" for heavy duty trucks that predicts an increase in NOx emissions as vehicle speeds exceed approximately 35 miles per hour. It is assumed that the NOx increase seen in later years is due to the congestion relief effects of the RTP and TCMs.

CARB is currently in the process of developing the next generation EMFAC (i.e., EMFAC2007) with a scheduled release date of November 2007. The EMFAC2007 development process includes a proposal to revise heavy duty truck speed correction factors to account for new information. The proposed NOx speed curves have a much flatter shape relative to EMFAC2002. This may demonstrate lower NOx emissions associated with heavy duty trucks in future years, though, considering changes are also proposed to the heavy duty truck emission factors, the ultimate effect of the new EMFAC model on the draft NOx emissions values reported here cannot be accurately predicted.

The draft emissions values shown below will be updated once the new EMFAC model is publicly available. Additionally, SCAG has been working with modeling experts and practitioners to develop a new Transportation Demand Model that is expected to more accurately forecast highway traffic volumes, speeds, and other aspects of the transportation system. The new Transportation Demand Model will be used for the Final 2007 AQMP if available within the development schedule of the AQMP.

Table 7
Transportation Strategy Emissions
(tons per day)

Pollutant	2010	2015	2020	2023
ROG	- 3.76	- 2.68	- 1.64	- 1.04
NOx	- 0.75	+1.06	+ 2.51	+ 2.51
PM2.5	- 0.37	- 0.44	- 0.60	- 0.55
CO	- 37.64	- 27.59	- 19.36	- 13.47

REASONABLY AVAILABLE CONTROL MEASURE ANALYSIS

Introduction

Clean Air Act Section 172(c)(1) requires SIPs to provide for the implementation of all reasonably available control measures (RACM) as expeditiously as practicable. Guidance on interpreting RACM requirements in the context of the 1990 Amendments was set forth in the General Preamble (57 FR 13498, 13560) in 1992. In the General Preamble, U.S. Environmental Protection Agency (EPA) interpreted section 172(c)(1) as imposing a duty on States to consider all available control measures and to adopt and implement measures that are reasonably available for implementation in a specific nonattainment area. It also retained an earlier interpretation of

RACM that it would not be reasonable to require the implementation of measures that do not advance the date for attainment.

With regard to TCMs, EPA revised earlier guidance by indicating that it is inappropriate to presume that all Section 108(f)(1)(A) measures of the CAA are available in all nonattainment areas. Instead, States should consider Section 108(f)(1)(A) measures as potential options that are not exhaustive, but indicative of the types of measures that should be considered. In addition, any measure identified as reasonably available during the public comment period should also be considered for implementation. EPA indicated that States could reject measures as not reasonably available for reasons related to local conditions. States are required to justify why available measures were not considered RACM and not adopted in the SIP.

To meet the RACM requirements articulated in the EPA guidance described above, this RACM analysis was performed using several steps. First is a description of the process by which SCAG and related transportation agencies in the South Coast Air Basin identify, review, and make enforceable commitments to implement TCMs. Second is the assembly and review of a list of control measures recently implemented in other ozone nonattainment areas. This effort involved a review of measures implemented in California nonattainment areas as well those located in Arizona, Texas, and Washington, and the organization of those measures in the 16 categories specified in CAA Section 108(f). The third step is to determine RACM measures by contrasting the list of candidate measures with measures implemented to date in the South Coast Air Basin, as well as any new commitments in the current AQMP. The fourth step is to provide a reasoned justification for any of the available measures that have yet to be implemented. These justifications must address criteria described in the above-cited guidance.

SCAG TCM Development Process

As defined by EPA, a TCM is any measure that is specifically identified and committed to in the applicable implementation plan that is either one of the types listed in Section 108(f)(1)(A) of the CAA, or any other measure for the purpose of reducing emissions or concentrations of air pollutants from transportation sources by reducing vehicle use or changing traffic flow or congestion conditions.

While the implementation of TCMs has played a role in improving air quality in the South Coast Air Basin, these measures are yielding fewer emission reductions over time because of technological advances of vehicle fleets. Thus, the CAA's requirement to adopt all RACM is a driving force governing whether and which TCMs are necessary for the SIP. During SIP preparation, areas are obligated to evaluate TCMs and determine whether they qualify as RACM. The TCM process and RACM analysis run concurrently, rather than consecutively, with the transportation planning process.

The RACM process relies predominantly on a continuous updating and addition process for TCMs. The TCM process was established for the South Coast Air Basin by replacing a process that developed TCMs each time a SIP was produced with a continuous ongoing TCM process. This process continues to govern the selection and implementation of TCMs today. TCMs are

continuously identified and reviewed throughout the transportation planning process. SCAG's ongoing public outreach effort, including an involved interagency input process via the Transportation Conformity Working Group (TCWG), helps ensure that the process to identify and review TCMs is robust, inclusive, and comprehensive. Development of TCMs arises from multiple processes and multiple sources, which include CTCs, subregional agencies, task forces, committees, and the public. Project sponsors have a strong incentive to develop and help identify TCMs because TCMs receive special consideration on Congestion Management and Air Quality (CMAQ) and Surface Transportation Program (STP) funds, and are assured timely implementation in accordance with the schedule in the RTIP. These funding and scheduling incentives ensure that TCMs are developed, sponsored, and clearly identified throughout the process.

The discussion below outlines the multiple processes and entities involved in the TCM planning process.

County Transportation Commissions

County Transportation Commissions must follow the most current RTIP Guidelines when preparing their lists of transportation improvements. The RTIP Guidelines state that "the RTIP is required to advance the RTP by programming the projects, programs, and policies contained in the Plan, in accordance with federal and state requirements."[7] As stated above, the RTIP Guidelines ensure that "TCMs require priority of funding (with special claim on CMAQ and STP funds), as well as timely implementation in accordance with the schedule in the RTP"[8]. The discussion below outlines the process used by Los Angeles County Metropolitan Transportation Authority (Metro), the Orange County Transportation Authority (OCTA), the San Bernardino Associated Governments (SANBAG), and the Riverside County Transportation Commission (RCTC) to develop their lists of transportation projects for each update of the RTIP and RTP.[9]

Los Angeles County Metropolitan Transportation Authority

The Metro begins its Transportation Improvement Program (TIP) process with a call for projects. The call for projects process meets federal and state planning and programming requirements for developing an integrated, multi-modal transportation system. The Call for Projects also addresses Metro's mandated responsibilities to the California Transportation Commission regarding the programming of the State TIP. There is a local match requirement that varies depending on the modal category and a public hearing before the Metro Board officially adopts the TIP. TCM projects are prioritized throughout Metro's process. In general, projects are evaluated based on three criteria: project need and purpose, cost effectiveness, and project readiness. Thus, TCM projects that are useful, economically feasible, and that are ready to be implemented in the near-term receive priority of funding and scheduling.

[7] Southern California Association of Governments. (October 2005). *Final 2006 Regional Transportation Improvement Programs Guidelines.* Los Angeles, CA.
[8] Southern California Association of Governments. (October 2005). *Final 2006 Regional Transportation Improvement Programs Guidelines.* Los Angeles, CA.
[9] Note, the other CTCs in the SCAG region (for Ventura and Imperial counties) are outside the South Coast Air Basin.

Orange County Transportation Authority

Cities in Orange County propose projects to OCTA through a competitive call for projects. OCTA, reviews and prioritizes the projects based on an approved set of criteria. Additionally, OCTA programs regionally significant projects that are of the highest importance to the County via the Comprehensive Funding Strategy and Long Range Transpiration Plan. Those projects that also qualify as TCMs are identified and included in the RTP and RTIP.

Riverside County Transportation Commission

The RCTC begins its process with a call for projects. RCTC staff and a RCTC Technical Advisory Committee comprised of local agency public works directors and senior planners review and evaluate projects for funding consideration against the funding criteria which may include air conformity benefits, mobility, congestion relief, safety, project readiness etc. per the eligibility parameters of the funds. Projects which meet the TCM criteria are identified immediately and a secondary review occurs to evaluate timely implementation and to ensure funding is committed to the project. Projects recommended for funding are sent to the RCTC Board for final approval. Approved projects are programmed in the RTIP with project monitoring then occurring on a quarterly basis to ensure the project is progressing satisfactorily.

San Bernardino Associated Governments

SANBAG conducts calls for projects. TCM projects receive priority for funding and implementation through application of evaluation criteria that reward projects that provide the greatest mobility and emissions benefit per allocated dollar.

Sub-regional Coordination and Regional Transportation Planning for Air Quality Management

The Subregional Coordinators Group is an important part of SCAG's participatory planning process and assists in balancing regional needs and prospects against local constraints and opportunities. Established in 1990, at the sub-region's initiative, the Group comprises administrators from Councils of Governments (COGs), cities and counties within the region and assists SCAG in the design and implementation of its administrative and programmatic tasks within realistic fiscal and local constraints.

The subregions help coordinate community outreach for discussion of the transportation policies, programs and projects, including effective and efficient TCM projects, nominated for inclusion in the long-range RTP and the short-range RTIP. SCAG then synthesizes these projects, programs and policies into a regionally coherent transportation strategy and assesses the environmental and equity consequences for the region as a whole.

Assembly and Review of Candidate RACM

EPA and related court decisions have maintained that TCMs considered RACM must be measures that 1) advance the attainment date, typically by at least one year and 2) are technologically and economically feasible. Measures must pass both the advance attainment and technical/economic feasibility tests to be deemed RACM.

U.S. EPA guidance documents provide help in identifying the type of measures to be considered. CAA Section 108(f)(1)(A) provides a list of sixteen categories of TCMs that are potential options that should be considered indicative types of control measures:

i. Programs for improved use of public transit;
ii. Restriction of certain roads or lanes to, or construction of such roads or lanes for use by, passenger buses or high occupancy vehicles;
iii. Employer-based transportation management plans, including incentives;
iv. Trip-reduction ordinances;
v. Traffic flow improvement programs that achieve emission reductions;
vi. Fringe and transportation corridor parking facilities, serving multiple occupancy vehicle programs or transit service;
vii. Programs to limit or restrict vehicle use in downtown areas or other areas of emission concentration, particularly during periods of peak use;
viii. Programs for the provision of all forms of high-occupancy, shared-ride services, such as the pooled use of vans;
ix. Programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;
x. Programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;
xi. Programs to control extended idling of vehicles;
xii. Programs to reduce motor vehicle emissions, consistent with Title II of the Clean Air Act, which are caused by extreme cold start conditions;
xiii. Employer-sponsored programs to permit flexible work schedules;
xiv. Programs and ordinances to facilitate non-automobile travel, provision and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity;
xv. Programs for new construction and major reconstruction of paths, tracks or areas solely for the use by pedestrian or other non-motorized means of transportation, when economically feasible and in the public interest; and
xvi. Programs to encourage the voluntary removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks.

EPA guidance has emphasized that these sixteen measures are an illustrative, but not exhaustive list. Instead, TCMs need to be evaluated on an area-by-area basis to determine which are reasonably available. In addition to the measures listed above, the 1992 General Preamble of the CAA cite other sources to include TCMs that were a) suggested during public comments (e.g. at workshops, public hearings, in written comments, etc.); b) adopted in other nonattainment areas of the country; and c) specifically identified by the EPA (i.e. EPA TCM database, support documents for rulemaking, etc.).[10]

[10] Seitz, John S. (December 14, 2000) Memo from John Seitz: Guidance on the Reasonably Available Control Measures (RACM) Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas. Available at: **http://www.epa.gov/ttn/oarpg/t1/memoranda/revracm.pdf.**

To develop a list of candidate RACM, SCAG performed a review of available TCMs in California, as well as in other states. SCAG reexamined the candidate RACM identified during the comprehensive RACM analysis performed for the 2003 AQMP. Additionally, SCAG coordinated with other MPOs and air quality districts to identify measures that are being implemented or considered in other nonattainment areas. SCAG reviewed TCMs implemented in California from various nonattainment areas (Sacramento, San Joaquin Valley, and the Bay Area). SCAG also coordinated with other agencies outside of the SCAG region in an effort to ensure that all RACM were considered (the Houston-Galveston Area Council [H-GAC] in Texas; Metropolitan Washington Council of Governments [MWCOG] in Washington D.C.[11;] and the Maricopa County Air Quality Department in Arizona. SCAG also utilized information from Arizona and Texas obtained in the 2003 AQMP RACM Analysis. The comprehensive list of candidate TCMs for RACM compiled in the UC Davis-Caltrans Air Quality Project, *Transportation Control Measures: Guidance for Conformity and State Implementation Plan Development* (August 2004), was also reviewed as part of the current RACM analysis.

Additionally, TCMs were discussed and reviewed at numerous TCWG meetings as part of the 2006 RTIP development process, as well as the development of this 2007 AQMP. Further, SCAG has an extensive and robust public participation process for the development of the RTP/RTIP through ongoing public meetings, and technical, advisory, and policy committees. These groups generally meet on a monthly basis and provide explicit opportunities for the public to participate and contribute.

In summary, SCAG performed the RACM analysis based on information reviewed from the following sources:

- CAA Section 108(f)(1)(A)
- 2003 South Coast AQMP RACM Analysis
- Other nonattainment areas in California
- Other nonattainment areas outside California
- Interagency Consultation (TCWG)
- RTP/RTIP Updates
- Candidate TCMs for RACM – UC Davis-Caltrans Air Quality Project[12]

The candidate measures were reviewed to determine which can be considered RACM. As discussed above, the RACM TCM requirement consists of two core criteria that must be satisfied: 1) TCMs must advance attainment of the air standards; and 2) TCMs must be both technically and economically feasible. EPA has left their definitions vague and has preferred to allow flexibility in each region's determination. EPA did not provide definitive guidance on "advancing attainment," but in practice, agencies have based their determination on whether a measure or group of measures would help an area achieve attainment one year earlier than in the absence of the measure or group of measures. In other words, TCM implementation must

[11] Draft list of candidate RACM were used for reference only and not published. Per e-mail from Jeff King, Metropolitan Washington Council of Governments (MWCOG). (June 8, 2006).
[12] UC Davis-Caltrans Air Quality Project. (August 18, 2004). *Transportation Control Measures: Guidance for Conformity and State Implementation Plan Development.*

significantly reduce emissions to facilitate attainment of the National Ambient Air Quality Standards (NAAQS) one year earlier than without the TCMs. Considering the magnitude of the emissions reductions necessary to demonstrate attainment in the South Coast Air Basin, the implementation of TCMs is not expected to meet this criterion.

Similarly vague is U.S. EPA's definition for the second criterion - technical and economical feasibility. Technical feasibility has been determined in terms of local factors, such as environmental impacts, availability of control measure, and ability to achieve the emission reduction.[13] EPA has not set firm thresholds to determine economic feasibility. Cost-effectiveness has been considered a determining factor. As a recent example, the Maricopa Association of Governments defined economic feasibility based on guidance from California air agencies, which included AQMD and Bay Area Air Quality Management District guidelines. They established that TCMs at or below approximately $8,400 to $9,000 per ton of PM10 reduced annually were cost-effective.[14]

Determining RACM Measures

For this step of the RCAM analysis, SCAG compared the list measures implemented within the South Coast Air Basin with those implemented in other areas. SCAG then organized all measures, including candidate measures and those measures currently implemented in the region, according to the sixteen categories specified in Section 108(f)(1)(A) of the CAA. No formal requirement exists on how to organize TCMs. However, SCAG utilized this organization scheme as a way to highlight those measures that fall within the sixteen CAA categories, which are formally recognized as "TCMs" and subject to CAA and federal conformity requirements. SCAG found a number of candidate measures that were not currently implemented in the region and not included in the 2003 AQMP RACM analysis.

Reasoned Justification

The fourth step is to provide a reasoned justification for any of the available measures that have yet to be implemented or will not be implemented. In 1999, EPA issued a memorandum entitled "Guidance on the Reasonably Available Control Measures Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas."[15] In this memorandum, EPA states that in order to determine whether a state has adopted all RACM necessary for attainment and as expeditiously as practicable, the state must explain why the selected implementation schedule is the earliest schedule based on the circumstances of the area. This indicated that States could reject measures as not reasonably available for reasons related to local conditions. In such cases, States are obligated to provide justification as to why potentially reasonable measures have not

[13] UC Davis-Caltrans Air Quality Project. (August 18, 2004). *Transportation Control Measures: Guidance for Conformity and State Implementation Plan Development.*
[14] Eisenger, D. and D. Niemeier. (November 2003). *Transportation Control Measures: Federal Requirements and SIP Development Considerations Poster.* Prepared for the Transportation Research Board's Annual Meeting, 2004.
[15] Seitz, John S. (December 14, 2000) *Memo from John Seitz: Guidance on the Reasonably Available Control Measures (RACM) Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas.* Available at: http://www.epa.gov/ttn/oarpg/t1/memoranda/revracm.pdf

been adopted. Valid reasons for rejecting a measure include that it would not advance the attainment date, it is economically infeasible, or it is technologically infeasible.

The complete listing of all candidate measures evaluated for RACM determination is included in Attachment C. A "Measure Number" is assigned for each strategy for ease of discussion (not rank in priority). The "Description" column provides a brief description of the relevant measure in discussion. "Has It Been Implemented?" confirms whether the measure is currently implemented in the SCAG region. The final column "Reasoned Justification for Not Implementing" provides a reasoned justification for those measures that were not considered RACM. SCAG appropriately considered a number of factors that included technical and economic feasibility, enforceability, geographic applicability, and ability to providing emission reductions. Of the TCMS that were deemed candidate measures, none were found to meet the criteria for RACM implementation.

Conclusion

CAA Section 172(c)(1) requires SIPs to provide for the implementation of all RACM as "expeditiously as practicable." EPA and related court decisions have maintained that TCMs considered RACM must be measures that 1) advance the attainment date, typically by at least one year and 2) are technologically and economically feasible. Measures must pass both the advance attainment and technical/economic feasibility tests to be deemed RACM.

Based on a comprehensive review of TCM projects in other nonattainment areas or otherwise identified, it is determined that the TCMs being implemented in the South Coast Air Basin are inclusive of all RACM. None of the candidate measures reviewed herein and determined to be infeasible meets the criteria for RACM implementation.

SCAG and the local transportation agencies have in place a comprehensive, formal process for identifying, evaluating, and selecting TCMs. The regular RTP, RTIP, and AQMP/SIP public update processes ensure that TCM identification and implementation is a routine consideration that helps SCAG and the AQMD demonstrate attainment of applicable NAAQS.